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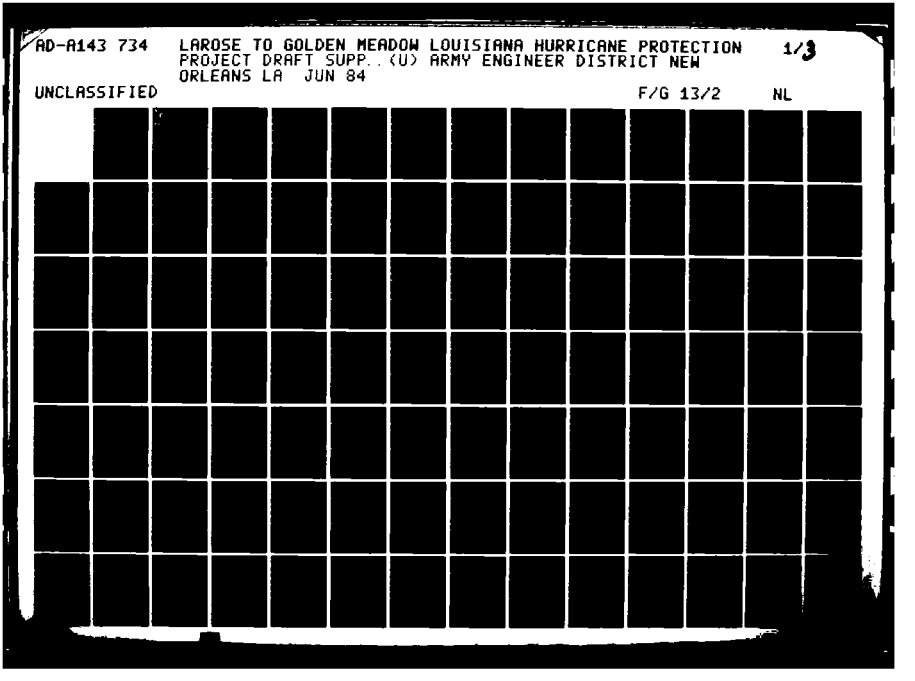
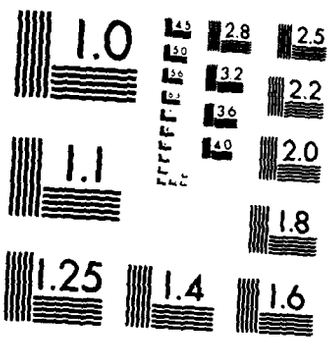
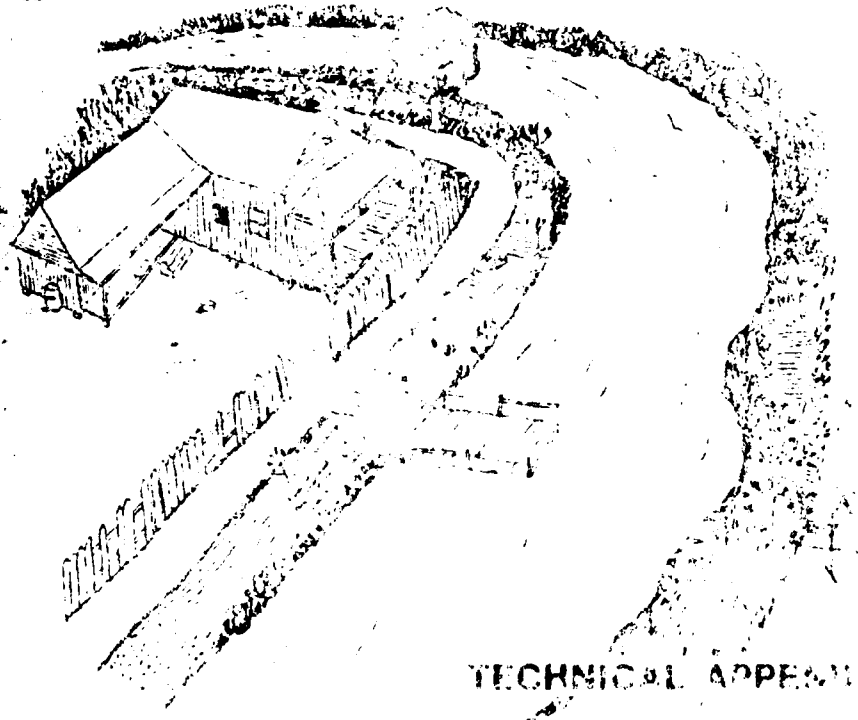




US Army Corps of Engineers
New Orleans District

JUNE 1984

DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT AND DRAFT MITIGATION REPORT



TECHNICAL APPENDIXES

LAROSE TO GOLDEN MEADOW

HURRICANE

APPENDIX A

NATURAL RESOURCES

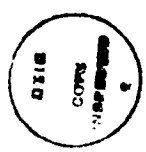
VOLUME 2

APPENDIX A - NATURAL RESOURCES

APPENDIX B - CONSISTENCY DETERMINATION
LOUISIANA COASTAL ZONE MANAGEMENT PROGRAM

APPENDIX C - DRAFT FISH AND WILDLIFE COORDINATION ACT REPORT

A



A-1

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LAROSE TO GOLDEN MEADOW HURRICANE PROTECTION PROJECT

APPENDIX A

NATURAL RESOURCES

This appendix contains technical information and methodologies concerning the natural resources of the study area. The appendix consists of nine separate sections. Section A.1 contains an alphabetized list of common and scientific names of plants and animals discussed in the report. Section A.2 contains the correspondence with the US Fish and Wildlife Service and National Marine Fisheries Service concerning endangered and threatened species which might occur in the study area. Section A.3 contains the methodology used to determine future-with and future-without project for fishery production. Section A.4 contains the methodology used to determine future-with and future-without project for habitat acreages. Section A.5 contains the State of Louisiana Water Quality Certificate. Section A.6 contains the Archeological Appendix to the report. Section A.7 contains the Recreational Appendix to the report. Section A.8 contains a table listing fur catch and value by marsh type. Section A.9 contains a table listing Primary Ambient Air Quality Standards for Louisiana.

A.1. LIST OF COMMON AND SCIENTIFIC NAMES OF PLANTS AND ANIMALS

A.1.1. This section contains an alphabetized list (Table A.1.1.) of the common names of plants discussed in the report with corresponding scientific names. The list is taken from Montz (1975 a, 1975 b, 1981).

TABLE A.1.1.

LIST OF COMMON AND SCIENTIFIC NAMES OF PLANTS

Common Name	Scientific Name
Baldcypress	*Taxodium distichum*
Bulltongue	*Sagittaria falcata*
Bullwhip	*Scirpus californicus*
Crabgrass	*Digitaria spp.*
Cyperus	*Cyperus spp.*
Deer pea	*Vigna luteola*
Dwarf spikerush	*Eleocharis parvula*
Duckpotato	*Sagittaria latifolia*
Eastern baccharis	*Baccharis halimifolia*
Floating waterprimrose	*Ludwigia peploides*
Giant cutgrass	*Zizaniopsis miliaceae*
Goldenrod	*Solidago spp.*
Green ash	*Fraxinus pennsylvanica*
Hackberry	*Celtis laevigata*
Jointgrass	*Paspalum vaginatum*
Live oak	*Quercus virginiana*
Marshelder	*Iva frutescens*
Marsh mallow	*Hibiscus lasiocarpus*
Oystergrass	*Spartina alterniflora*
Palmetto	*Sabal minor*
Red maple	*Acer rubrum*
Saltgrass	*Distichlis spicata*

TABLE A.1.1. (CONTINUED)

LIST OF COMMON AND SCIENTIFIC NAMES OF PLANTS

Common Names	Scientific Names
Saltmarsh morning glory	*Ipomoea sagittata*
Saltmarsh pluchea	*Pluchea purpurascens*
Smartweed	*Polygonum spp.*
Southern cattail	*Typha domingensis*
Sweetgum	*Liquidambar styraciflua*
Tupelogum	*Nyssa aquatica*
Virginia willow	*Itea virginica*
Walters millet	*Echinocloa walteri*
Waxmyrtle	*Myrica cerifera*
Wiregrass	*Spartina patens*

LITERATURE CITED

Montz, G.N. 1975a. Master List of Herbs, Fern and Fern Allies, and Vines of the New Orleans District. US Army Corps of Engineers, New Orleans, mimeograph report, 72 pp.

_____. 1975b. Master List of Trees and Shrubs of the New Orleans District. US Army Corps of Engineers, New Orleans, Mimeograph report, 30 pp.

_____. 1981. Annotated Checklist of Plants on the Coastal Beaches, Islands and Barrier Islands of Louisiana. US Army Corps of Engineers, New Orleans, Mimeograph report, 43 pp.

_____. 1981. Annotated Checklist of Plants of the Atchafalaya and Mississippi River Deltas. US Army Corps of Engineers, New Orleans, Mimeograph report, 35 pp.

A.1.2. LIST OF COMMON AND SCIENTIFIC NAMES OF ANIMALS

This section contains an alphabetized list (Table A.1.2.) of the common names of animals discussed in the report with corresponding scientific names. The following taxonomic sources were used: Eddy and Underhill (1978); Robins (1980); Pennak (1978); Lowery (1974a); Lowery (1974b); and Conant (1975).

TABLE A.1.2.

INVERTEBRATES

Common Name	Scientific Name
Amphipods	Amphipoda[1/]
Blue crabs	*Callinectes sapidus*
Brown shrimp	*Penaeus aztecus*
Chironomids	Chironomidae[3/]
Clams	Pelecypoda[1/]
Crawfish	Astacidae[3/]
Grass shrimp	Palaemonetes[4/]
Isopods	Isopoda[1/]
Mysids	Mysidacea[1/]
Polychaete worms	Polychaeta[1/]
Tubificid worms	Tubificidae[3/]
White shrimp	*Penaeus setiferus*

1/ Order
2/ Suborder
3/ Family
4/ Genus

TABLE A.1.2. (CONT.)

FISH

Common Name	Scientific Name
Alligator gar	*Lepisosteus spatula*
Atlantic croaker	*Micropogonias undulatus*
Atlantic threadfin	*Polydactylus octonemus*
Bay anchovy	*Anchoa mitchilli*
Bay whiff	*Citharichthys spilopterus*
Bluegill	*Lepomis macrochirus*
Channel catfish	*Ictalurus punctatus*
Freshwater drum	*Aplodinotus grunniens*
Gizzard shad	*Dorosoma cepedianum*
Golden shiner	*Notemigonus crysoleucas*
Gulf menhaden	*Brevoortia patronus*
Hardhead catfish (sea catfish)	*Arius felis*
Largemouth bass	*Micropterus salmoides*
Largemouth buffalo	*Ictiobus cyprinellus*
Longnose gar	*Lepisosteus osseus*
Longnose killifish	*Fundulus similis*
Mosquitofish	*Gambusia affinis*
Red drum	*Sciaenops ocellatus*
Sailfin molly	*Poecilia latipinna*
Sand seatrout	*Cynoscion arenarius*
Sheepshead	*Archosargus probatocephalus*
Sheepshead minnow	*Cyprinodon variegatus*
Smallmouth buffalo	*Ictiobus bubalus*
Southern flounder	*Paralichthys lethostigma*
Spot	*Leiostomus xanthurus*
Spotted seatrout	*Cynoscion nebulosus*
Striped mullet	*Mugil cephalus*
Threadfin shad	*Dorosoma petenense*
Tidewater silverside	*Menidia penninsulae*

TABLE A.1.2. (CONT.)

REPTILES

Common Name	Scientific Name
American alligator	*Alligator mississipiensis*
Frogs	Anura[1/]
Turtles	Testudines[1/]
Snakes	Serpentes[2/]

TABLE A.1.2. (CONT.)

BIRDS

Common Name	Scientific Name
American bittern	Botaurus lentiginosus
American coot	Fulica americana
American goldfinch	Spinus tristis tristis
American kestrel	Falco sparverius
American widgeon	Mareca americana
American woodcock	Philohela minor
Barn owl	Alba pratincola
Black-necked stilt	Himantopus mexicanus
Blue jay	Cyanocitta cristata
Blue-winged teal	Anas discors
Cardinal	Richmondena cardinalis
Cattle egret	Bubulicus ibis
Clapper rail	Rallus longirostris
Common moorhen	Gallinula chloropus cachinnans
Common snipe	Capella gallinago delicata
Crow	Corvus brachyrhynchos
Eastern bluebird	Sialia sialis
Eastern meadowlark	Sturnella magna
Gadwall	Anas strepera
Green-winged teal	Anas carolinensis
Heron	Ardeidae 2/
Ibis (white)	Gaura alba
King rail	Rallus elegans
Lesser scaup	Aythya offinis
Mallard	Anas platyrhynchos
Mottled duck	Anas fulvigula
Mourning dove	Zenaldura macroura
Northern pintail	Anas acuta tzitzihoa

TABLE A.1.2. (CONT.)

BIRDS

Common Names	Scientific Names
Northern Shoveler	*Spatula clypeata*
Red-tailed hawk	*Buteo jamaicensis*
Ring-necked duck	*Aythya collaris*
Sora	*Porzana carolina*
Vulture	*Cathartes aura*
Wood duck	*Aix sponsa*
Woodpecker	Picidae [3/]

TABLE A.1.2. (CONT.)

MAMMALS

Common Names	Scientific Names
Eastern cottontail rabbit	Sylvilagus floridanus alacer
Fox squirrel	Sciurus niger subauratus
Gray squirrel	Sciurus carolinensis fuliginosus
Marsh rice rat	Oryzomys palustris texensis
Mink	Mustela vison vulgivaga
Muskrat	Ondatra zibethicus rivalicius
Nine-banded armadillo	Dasypus novemcinctus Mexicanus
Nutria	Myocastor coypus bonariensis
Opossum	Didelphis virginiana
Raccoon	Procyon lotor megalodous
River otter	Lutra canadensis lataxina
Swamp rabbit	Sylvilagus aquaticus aquaticus
White-tail deer	Odocoileus virginianus

LITERATURE CITED

Eddy, S. and Underhill, J.C. 1978. Freshwater Fishes. Third Edition. Wm. C. Brown Company Publishers, Dubuque, Iowa. 215 pp.

Conant, R. 1975. A Field Guide to Reptiles and Amphibians. Sec. Ed. National Audubon Society and National Wildlife Federation. Houghton Mifflin Company, Boston. 429 pp.

Lowery, G.H., Jr. 1974a. The Mammals of Louisiana and its Adjacent Waters. Louisiana State University Press and Kingsport Press, Kingsport, Tennessee. 565 pp.

....1974b. Louisiana Birds. Louisiana State University Press and Kingsport Press, Kingsport, Tennessee. 651 pp.

Pennak, R.W. 1978. Fresh-water Invertebrates of the United States. Sec. Ed. John Wiley and Sons Inc., New York. 803 pp.

Robins, R.C. (Chairman) 1980. A list of Common and Scientific Names of Fishes from the United States and Canada. American Fishery Society, Spec. Pub. No. 12. 174 pp.

A.2. ENDANGERED AND THREATENED SPECIES

This section contains the correspondence between the New Orleans District, Corps of Engineers; the US Fish and Wildlife Service (FWS); and National Marine Fisheries Service (NMFS). As mandated by Section 7(c) of the Endangered Species Act Amendments of 1978, the FWS and NMFS were requested to provide information concerning endangered or threatened species which might occur in the project and mitigation areas. Data provided by each agency indicated that no endangered or threatened species is likely to occur in either area. Thus, this correspondence concludes our responsibilities under Section 7(c).

April 13, 1983

IN REPLY REFER TO:

Planning Division
Environmental Analysis Branch

Mr. Dennis B. Jordan, Field Supervisor
U. S. Department of Interior
Fish and Wildlife Service
Jackson Mall Office Center
300 Woodrow Wilson Avenue, Suite 3185
Jackson, Mississippi 39213

Dear Mr. Jordan:

In accordance with Section 7(c) of The Endangered Species Act Amendments of 1978, we are requesting information concerning threatened and/or endangered species that may occur within the vicinity of the Larose to Golden Meadow hurricane protection project - mitigation area, located in Lafourche and Terrebonne Parishes, Louisiana. (See enclosure 1.)

The proposed mitigation plan was developed after our initial coordination with your agency (letter dated June 1, 1981). The mitigation plan would consist of the construction of a 7-mile-long, earthen levee and three water control structures within the Pointe au Chien Wildlife Management Area. These structural measures are expected to curtail further wetland habitat degradation in the mitigation area due to saltwater intrusion.

There are 4,497 acres of wetland habitat in the proposed mitigation area. Of this total, 2,243 acres are fresh/intermediate marsh. The vegetation in this marsh type includes bull-tongue, cyperus, wiregrass, Pluchea, dwarf spikerush, saltgrass, deerpea, and saltmarsh morning glory. There are 804 acres of brackish marsh which are dominated by wiregrass and saltgrass. The remaining 1,450 acres consist of open water scattered throughout the proposed mitigation area.

Please provide us with a list of endangered and threatened species and species proposed for listing which may occur in the project mitigation area.

Sincerely,

ORIGINAL SIGNED by:

Cletis R. Wagahoff
Chief, Planning Division

Enclosure

Similar letter sent to Charles A. Oravetz/National Marine Fisheries Service
St. Petersburg Florida

United States Department of the Interior

FISH AND WILDLIFE SERVICE
JACKSON MALL OFFICE CENTER
300 WOODROW WILSON AVENUE, SUITE 3185
JACKSON, MISSISSIPPI 39213

April 28, 1983

IN REPLY REFER TO:
Log no. 4-3-83-190

Mr. Cletis R. Wagahoff
Chief, Planning Division
New Orleans District, Corps of Engineers
P.O. Box 60267
New Orleans, Louisiana 70160

Dear Mr. Wagahoff:

This responds to your letter of April 13, 1983, requesting endangered species information for the vicinity of the Larose to Golden Meadow hurricane protection project-mitigation area, located in Lafourche and Terrebonne Parishes, Louisiana.

Our records indicate no endangered, threatened or proposed species, or their Critical Habitat occurring in the project area. Therefore, no further endangered species consultation will be required for this project, as currently described.

If you anticipate any changes in the scope or location of this project, please contact our office at 601/960-4900 for further coordination.

We appreciate your participation in the effort to protect endangered species.

Sincerely yours,

Dennis B. Jordan
Field Supervisor
Jackson Endangered Species Office

cc: D, FWS, Washington, D.C. (AFA/OES)
RD, FWS, Atlanta, GA (AFA/SE)
ES, FWS, Lafayette, LA
Department of Wildlife & Fisheries
New Orleans, LA

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Southeast Region
9450 Koger Boulevard
St. Petersburg, FL 33702

April 11, 1983

Mr. Cletis R. Wagahoff
Chief, Planning Division
New Orleans District, Corps of Engineers
P.O. Box 60267
New Orleans, Louisiana 70160

Dear Mr. Wagahoff:

This responds to your April 1, 1983, letter requesting a list of endangered/threatened species under our purview that may occur in the vicinity of the Larose to Golden Meadow hurricane protection project-mitigation area, located in Lafourche and Terrebonne Parishes, Louisiana. Your request was made in accordance with Section 7 of the Endangered Species Act of 1973.

We have reviewed the proposed project and have determined that no species of listed sea turtles or whales are likely to occur in the proposed project area.

This concludes consultation responsibilities under Section 7 of the Endangered Species Act of 1973. However, consultation should be reinitiated if new information reveals impacts of the identified activity that may affect listed species or their critical habitat, a new species is listed, the identified activity is subsequently modified or critical habitat determined that may be affected by the proposed activity.

Sincerely yours,

Chuck Oravetz

Charles A. Oravetz, Chief
Protected Species Management Branch

cc:
FWS Jackson, MS

LMNPD-RE

9 June 1981

Mr. Gary Hickman
Area Manager
US Department of Interior
Fish and Wildlife Service
200 East Pascagoula St., Suite 300
Jackson, MS 39201

Dear Mr. Hickman:

In compliance with Section 7(c) of the Endangered Species Act Amendments of 1978, we are requesting information concerning the threatened and/or endangered species associated with the project, Larose to Golden Meadow, Louisiana, Hurricane Protection, located in Lafourche Parish in southeast Louisiana (Inclosure 1).

Plans for the project include the construction of a floodgate on Bayou Lafourche south of Golden Meadow, construction of the portions of the levee remaining to be built on the west and east side of the bayou, and proposed construction along alinements around Clovelly Farms and the Louisiana Lands and Exploration area (shown in blue, Inclosure 2).

The project area is primarily drained wetlands surrounded by intermediate and brackish marsh, cypress-tupelogum swamp, and some natural ridge forest.

Please provide us with a list of endangered and threatened species and species proposed for listing which may occur in the project area.

Sincerely,

ORIGINAL SIGNED BY

2 Inclosures
As stated

JAMES F. ROY
Chief, Planning Division

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
200 EAST PASCAGOULA STREET, SUITE 300
JACKSON, MISSISSIPPI 39201

July 1, 1981

IN REPLY REFER TO:
Log no. 4-3-81-147

Mr. James F. Roy
Chief, Planning Division
Department of the Army
New Orleans District, Corps of Engineers
LMNPD-RE
P.O. Box 60267
New Orleans, Louisiana 70160

Dear Mr. Roy:

This refers to your letter of June 9, 1981, in which you requested endangered species information for the area of the Larose to Golden Meadow Hurricane Protection Project located in Lafourche Parish, Louisiana.

Our data indicate that there are no endangered, threatened, or proposed species likely to reside in the project area, and there is no designated Critical Habitat in the vicinity of this project. Therefore, no further endangered species coordination will be required for this project, as described. If you anticipate any changes in project location or activities, however, please contact our office for further coordination.

If you have any questions concerning this project, please contact Fred Bagley of our staff, telephone number 601/960-4912 or FTS 490-4912.

We appreciate your participation in the effort to ensure the survival of endangered species.

Sincerely,

Dennis B. Jordan

Acting for Gary L. Hickman
Area Manager

cc: RD, FWS, Atlanta, GA (ARD-FA/SE)
ES, FWS, Lafayette, LA
Department of Wildlife & Fisheries
New Orleans, LA

IN REPLY REFER TO
LMNPD-RE

12 October 1982

Mr. Charles A. Oravetz
Chief, Marine Mammals and Endangered Species Branch
National Marine Fisheries Service
Southeast Region
9450 Koger Blvd.
St. Petersburg, FL 33702

Dear Mr. Oravetz:

In accordance with Section 7(c) of the Endangered Species Act Amendments of 1978, we are requesting information concerning threatened and/or endangered species which may occur within the vicinity of the Larose to Golden Meadow Hurricane Protection project, located in Lafourche Parish in Southeast Louisiana (Inclosure 1).

The project consists of the construction of a floodgate on Bayou Lafourche, south of Golden Meadow, Louisiana; construction of the portions of the levee remaining to be built on the west and east side of the bayou; and proposed construction along alinements around Clovelly Farms and Louisiana Lands and Exploration (Inclosure 2, shown in blue).

The project area consists primarily of agricultural lands surrounded by intermediate to brackish marsh, cypress-tupelogum swamp, and some natural ridge forest.

Please provide us with a list of endangered and threatened species and species proposed for listing which may occur in the project area.

Sincerely,

ORIGINAL SIGNED BY

CLETIS R. WAGAHOFF
Chief, Planning Division

2 Inclosures
as stated

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Southeast Region
9450 Koger Boulevard
St. Petersburg, FL 33702

October 19, 1982 F/SER64:AM

Mr. Cletis R. Wagahoff
Chief, Planning Division
New Orleans District, Corps of Engineers
P. O. Box 60267
New Orleans, LA 70160

Dear Mr. Wagahoff:

This responds to your October 12, 1982, letter regarding the Larose to Golden Meadow Hurricane Protection project, located in Lafourche Parish, Louisiana. You requested a list of endangered or threatened species under our purview that may be found in the project area, as required by Section 7 of the Endangered Species Act of 1973.

We have reviewed the proposed project and have determined that no species of listed sea turtles or whales are likely to occur in the proposed project area. This concludes consultation responsibilities under Section 7 of the Endangered Species Act of 1973. However, consultation should be reinitiated if new information reveals impacts of the identified activity that may affect listed species or their critical habitat, a new species is listed, the identified activity is subsequently modified or critical habitat determined that may be affected by the proposed activity.

The Fish and Wildlife Service should also be contacted for species under their purview if you have not done so already.

Sincerely yours,

Charles A. Oravetz

Charles A. Oravetz
Chief, Marine Mammals and Endangered
Species Branch

cc:
FWS, Jackson, MS

A.3. METHODOLOGY FOR FISHERY IMPACT ANALYSIS

A.3.1. This discussion explains the methodology used to determine the estimated fishery harvest contributed by the marsh habitat in the project area. The estimated harvest in the future-without project is compared to the estimated harvest in the future-with the different alternatives.

A.3.2. The area to be impacted lies within Hydrologic Unit IV, as defined by Chabreck (1972). Recent studies (Ader, 1980) have shown that the total acreage of marsh in Hydrologic Unit IV declined from 532,500 acres in 1956 to 406,000 acres in 1978. To estimate the number of acres present in Hydrologic Unit IV in base year 1975, the percent per year loss over the 22-year period was calculated based on acreage of marsh present in 1956 and 1978. It was calculated that total marsh acreage was being lost at 1.22 percent per year. Thus, in base year 1975, there would have been 421,726 acres of marsh in Hydrologic Unit IV.

A.3.3. Table A.3.1 provides a summary of the 1963-1978 average annual commercial harvest and value of the major estuarine-dependent commercial fishes and shellfishes for Hydrologic Unit IV.

A.3.4. To determine fishery harvest per acre, Hydrologic Unit IV average adjusted harvest data (302,950,000 pounds) was divided by the total acres of marsh in Hydrologic Unit IV present in base year 1975. This calculation yields an average commercial harvest of 718 pounds per acre of marsh.

A.3.5. To determine value per acre, the average annual value reported for Hydrologic Unit IV ($75,130,000) was divided by adjusted harvest data (302,950,000 lbs.). This calculation yields an average commercial harvest value of $0.25 per pound. This value multiplied by the pounds per acre (718 pounds/acre) of harvest yields dollars per acre ($179.50).

TABLE A.3.1.

AVERAGE ANNUAL COMMERCIAL HARVEST [1] AND VALUE OF MAJOR ESTUARINE-DEPENDENT FINFISHES AND SHELLFISHES ATTRIBUTABLE TO HYDROLOGIC UNIT IV (BARATARIA BAY), LOUISIANA COASTAL AREA

SPECIES	HYDROLOGIC UNIT IV
Menhaden	
Harvest [2]	225.81
Value [3]	12.60
Shrimp	
Harvest	23.23
Adjusted Harvest [4]	42.26
Value	45.05
Oyster	
Harvest	4.05
Adjusted Harvest [5]	10.13
Value	14.79
Croaker [6]	
Harvest	15.25
Value	0.82
Blue Crab	
Harvest	3.56
Value	1.10
Seatrout	
Harvest	2.70
Value	0.47
Spot	
Harvest	2.88
Value	0.14
Red Drum	
Harvest	0.36
Value	0.16

TABLE A.3.1. (CONT.)

Total	
Harvest	277.84
Adjusted Harvest	302.95
Value	75.13

Source: National Marine Fisheries Service landing records for the years 1963-1978, compiled by New Orleans District, Corps of Engineers.

1/ Harvest refers to total recorded commercial catch of a particular species from an area. The catch from offshore waters was assigned to inshore areas based on the relative abundance of estuarine marsh habitat.

2/ Millions of pounds.

3/ Millions of 1981 dollars. Value for all species except oysters represents running average of 1974-1978 exvessel prices brought to 1981 price levels using the Consumer Price Index for food. Average price for oysters calculated for period 1976-1980.

4/ Reflects 200 percent increase of reported inshore landings, based on surveys conducted by Louisiana Department of Wildlife and Fisheries (C.J. White, personal communication, letter dated April 23, 1979).

5/ Reflects 150 percent increase of reported landings, based on Mackin and Hopkins (1962) and Lindall et al. (1972).

6/ Includes food fish and industrial bottomfish. Quantities of croaker, spot, and seatrout calculated after Lindall et al. (1972).

A.3.6. Table A.3.2. shows the estimated pounds and dollar value of the potential fishery harvest contributed by the marsh acreage in the project area for each plan and future-without project conditions.

A.3.7. Table A.3.3. shows the estimated pounds and dollar value of the potential annual fishery harvest contributed by the marsh acreage associated with Louisiana Land and Exploration Company and Clovelly Farms under future-without project conditions. Under future-with project for each farm, potential annual fishery harvest would be zero by the year 1991.

A.3.8. This methodology is crude, and it is assumed that pounds per acre and dollar value per acre remain constant, with only marsh acreage being variable.

TABLE A.3.2.

COMPARISON OF FUTURE-WITHOUT PROJECT TO FUTURE-WITH PROJECT POTENTIAL ANNUAL FISHERY HARVEST

Target Year	Alternative	Marsh[1/] (acres)	Harvest (pound)	Value (dollars)
1975	Base	1,938	1,391,484	347,871
	Plan 1 (TSP)	1,938	1,391,484	347,871
	Plan 2	1,938	1,391,484	347,871
	Plan 3	1,938	1,391,484	347,871
	Plan 4	1,938	1,391,484	347,871
	Plan 5	1,938	1,391,484	347,871
1986	FWO[2/]	1,669	1,198,342	299,585
	Plan 1 (TSP)	1,100	789,800	197,450
	Plan 2	1,146	822,828	205,707
	Plan 3	1,144	821,392	205,348
	Plan 4	1,197	859,446	214,861
	Plan 5	1,141	819,238	204,809
1991	FWO	1,559	1,119,362	279,840
	Plan 1 (TSP)	0	0	0
	Plan 2	43	30,874	7,718
	Plan 3	80	57,440	14,360
	Plan 4	132	94,776	23,694
	Plan 5	496	356,126	89,032
1996	FWO (TSP)	1,457	1,046,126	261,531
	Plan 1	0	0	0
	Plan 2	40	28,720	7,180
	Plan 3	73	52,414	13,103
	Plan 4	123	88,314	22,078
	Plan 5	451	323,818	80,954
2026	FWO	969	695,742	173,935
	Plan 1 (TSP)	0	0	0
	Plan 2	27	19,386	4,846
	Plan 3	42	30,156	7,539
	Plan 4	82	58,876	14,719
	Plan 5	258	185,244	46,311
2096	FWO	374	268,532	67,133
	Plan 1 (TSP)	0	0	0
	Plan 2	10	7,180	1,795
	Plan 3	13	9,347	2,333
	Plan 4	32	22,976	5,744
	Plan 5	81	58,158	14,539

1/ Refer to Section A.4 for methodology used to determine marsh loss rate in project area.

2/ Future-Without Project.

TABLE A.3.3.

FUTURE-WITHOUT PROJECT POTENTIAL ANNUAL FISHERY HARVEST FOR CLOVELLY FARMS AND LOUISIANA LANDS AND EXPLORATION (LL&E)

Target Year	Farm Segment	Marsh (acres)	Harvest (pounds)	Value (dollars)
1975	Clovelly Farms	110	79,090	19,745
1986		88	63,272	15,796
1991		80	57,520	14,360
1996		73	52,487	13,103
2026		42	30,198	7,539
2096		13	9,347	2,333
1975	LL&E	54	38,826	9,693
1986		46	33,074	8,257
1991		43	30,917	7,718
1996		40	28,760	7,180
2026		27	19,413	4,846
2096		10	7,180	1,795

LITERATURE CITED

Ader, Robert R. 1980. Mississippi Deltaic Plain Region Habitat Acreage Data. National Coastal Ecosystems Team, US Fish and Wildlife Service, Office of Biological Services.

Chabreck, R.H. 1972. Vegetation, water, and soil characteristics of the Louisiana Coastal Region. Louisiana State University, Agricultural Experiment Station Bulletin 664. 72 pp.

A.4. METHODOLOGIES FOR TABLE A.4.1., "COMPARISON OF FUTURE-WITHOUT PROJECT HABITAT ACREAGES TO FUTURE-WITH PROJECT ACREAGES"

A.4.1. Five natural habitat types [fresh/intermediate marsh, brackish marsh, open water, wooded swamp, and bottomland hardwoods (BLHW)] could be impacted by the project alternatives. Three new habitat types (levee, pasture, and residential/commercial) would be created as a result of project activities. All habitat types were determined by using the Mississippi Deltaic Plain Region habitat mapping study (Wicker et al., 1980). After the pertinent habitat types were determined, the area of impact was planimetered from US Geological Survey (USGS) 1:24000 quandrangle maps and project design maps for the base year 1975. Corresponding habitat maps illustrating habitat acreages for 1956 and 1978 were used to determine the without-project habitat change for the 22-year period. The change of the habitat types under consideration was converted to a percent change per year. This percent change was used to predict the number of acres of each natural habitat type which was present in the project area in 1975 and would be present until the year 2096 (100-year project life). In calculating the projected habitat loss, a worst-case analysis was assumed. Based on calculated rates of habitat change between the 1956 and 1978 habitat maps, fresh/intermediate marsh is being lost at a rate of 3.22 percent per year. Total marsh is lost at an annual rate of 1.35 percent, which is also equal to brackish marsh loss per year. For comparative purposes, marsh loss rates were obtained for the Barataria and Breton Sound Basins.[1/] Annual total marsh loss rates for these two basins were 1.12 and 0.66 percent per year, with fresh/intermediate marsh being lost at 2.56 and 2.89 percent per year, respectively.

1/ Louisiana Coastal Area, Louisiana, "Freshwater Diversion to Barataria and Breton Sound Basins." US Army Corps of Engineers, New Orleans District, Draft, March 1982, p. D-27-37.

A.4.2. Based on the habitat maps for the study area, 60 percent of fresh/intermediate marsh lost became open water, and 40 percent became brackish marsh. This trend would apply only to fresh/intermediate marsh not inclosed by the project (Plans III, IV, & V) which would undergo natural succession. Also, it was assumed (worst case) that as fresh/intermediate marsh became brackish marsh, the same erosive forces that were affecting the fresh marsh also would affect the newly converted or existing brackish marsh. A 1.35 percent loss was calculated, with the loss becoming open water. Those marsh acres which would be inclosed by the project levee were calculated to be lost as follows. Fresh/intermediate was lost at 3.22 percent per year and total marsh was lost at 1.35 percent per year. To determine brackish marsh for a given year, fresh marsh was subtracted from total marsh for that given year and the difference was remaining brackish marsh. Total marsh loss between target years was converted to open water. This rationale applies for all plans through target year 1986. All inclosed marsh and open water (with the exception of borrow pits) were assumed to be drained by 1991. About 84 percent was converted to pasture and 16 percent to residential/commercial uses.

A.4.3. Total forest habitat was calculated to have a future-without project lost rate of 1.49 percent per year and wooded swamp was lost at 3.93 percent per year. Bottomland hardwood forest change was computed by subtracting the number of acres of wooded swamp from the number of total forest acres for that same target year. According to the trends of forest loss, 84 percent was converted to pasture and 16 percent was converted to residential/commercial use. Forest habitats not inclosed by the project were calculated at the same rate of loss as described above, throughout project life. In the case where total forest (not inclosed) consisted only of bottomland hardwood forest (Plans II and IV), the rate of loss was the same as total forest loss (1.49%). Forest habitat inclosed by the project was assumed to undergo an accelerated rate of loss due to its desirability to local

interest for residential and agricultural uses. The accelerated rate loss was predicted to be double the rate loss for total forest and wooded swamp. The accelerated rate loss was applied (2.98% total forest and 7.86% wooded swamp) for target years 1991 through 2096.

A.4.4. In Table A.4.1., the 1975 base condition represents 4,598 acres by habitat type located in the study area [the proposed project alinement (Tentatively Selected Plan) and those areas expected to be impacted due to inclosure & pumping]. For each alternative, the number of acres which eventually would be affected over the life of the project is shown. For example, Plan 2 includes the modified General Design Memorandum (GDM) and Clovelly Farms alinement. With this plan, there are 1,093, 791, 1,533, 141, and 721 acres of fresh/intermediate marsh, brackish marsh, open water, wooded swamp, and bottomland hardwoods, respectively. However, over the life of the project, these acres would be lost, due to direct and secondary project impacts (PI). Also represented are 319 acres which would be affected by Plan 1 but not be affected by Plan 2, and which would undergo natural change (NC). The 319-acre difference is due to the deletion of LL&E farms from Plan 2. These acres are shown in the NC category so that the study area is the same for each plan. Each alternative is represented in this manner for each target year over the life of the project through target year 2096.

A.4.5. Target years are significant dates in the project life based upon estimates of construction time, assumptions of indirect project impacts, and assumptions of the impact of drainage on wetland succession.

- o 1975: beginning of project
- o 1986: completion of first lift
- o 1991: completion of drainage of wetlands inside the levee system (assume that pumping would begin after completion of first lift and continue for five years)

- o 1996: completion of all three project lifts
- o 2026: near complete loss of wooded swamp due to draining and clearing
- o 2096: end of project life

A.4.6. By 1991, drainage of wet areas inside the levee system should be complete. At this time, all inclosed marsh and waterbodies would become pasture and residential/commercial. The inclosed forests would decrease at the rates previously described.

A.4.7. Tables A.4.2. and A.4.3. show base condition, future-with project and future-without project conditions for the Louisiana Land and Exploration Company and Clovelly Farms.

LITERATURE CITED

Wicker, Karen M., et al. 1980. Mississippi Deltaic Plain Region Ecological Characterization: a habitat mapping study. A users guide to the habitat maps. US Fish and Wildlife Service, Office of Biological Services. FWS/OBS-79/07. 84 pp.

TABLE A.4.1.

COMPARISON OF FUTURE-WITHOUT PROJECT HABITAT ACREAGES TO FUTURE-WITH PROJECT HABITAT ACREAGES

Target Year[2/]	Alternatives	Fresh/ Intermediate Marsh	Brackish Marsh	Open Water	Wooded Swamp	Bottomland Hardwoods	Levee	Pasture	Residential/ Commercial	Total Acreage Affected
1975	Base Condition[1/]	1,093	845	1,638	141	881			4,598	
	Plan 1 (GDM, CF, LL&E)	1,093	845	1,638	141	881	0	0	0	4,598
	Project Impact (PI)	1,093	845	1,638	141	881	0	0	0	
	Natural Change (NC)	0	0	0	0	0	0	0	0	
	Plan 2 (GDM & CF)	1,093	845	1,638	141	881	0	0	0	4,598
	PI	1,093	791	1,533	141	721	0	0	0	
	NC	0	54	105	0	160	0	0	0	
	Plan 3 (GDM & LL&E)	1,093	845	1,638	141	881	0	0	0	4,598
	PI	983	845	1,531	141	881	0	0	0	
	NC	110	0	107	0	0	0	0	0	
	Plan 4 (GDM)	1,093	845	1,638	141	881	0	0	0	4,598
	PI	983	791	1,426	141	721				
	NC	110	54	212	0	160	0	0	0	
	Plan 5 (LED)	1,093	845	1,638	141	881	0	0	0	4,598
	PI	412	845	1,294	97	592	0	0	0	
	NC	681	0	344	44	289	0	0	0	

[1/] See Section A.4.1
[2/] See Section A.4.5

Abbreviations

GDM - General Design Memorandum Alinement
CF - Clovelly Farms
LL&E - Louisiana Lands and Exploration
PI - Project Impact
NC - Natural Change
LED - Least Environmental Damaging

TABLE A.4.1. (CONT.)

Target Year[2/]	Alternatives	Fresh/ Intermediate Marsh	Brackish Marsh	Open Water	Wooded Swamp	Bottomland Hardwoods	Levee	Pasture		Residential/ Commercial	Total Acreage Affected
1986	Without Project	763	906	1,907	91	755	0	131	25	4,598	
	Plan 1 (GDM, CF, LL&E)	504	596	1,961	78	552	794	95	18	4,598	
	Project Impact (PI)	504	596	1,961	78	552	794	95	18		
	Natural Change (NC)	0	0	0	0	0	0	0	0		
	Plan 2 (GDM & CF)	504	642	1,869	78	662	712	111	21	4,599	
	PI	504	596	1,755	78	526	712	91	17		
	NC	0	46	114	0	136	0	20	4		
	Plan 3 (GDM & LL&E)	546	598	1,956	78	552	755	95	18	4,598	
	PI	469	587	1,827	78	552	755	95	18		
	NC	77	11	129	0	0	0	0	0		
	Plan 4 (GDM	483	714	1,856	78	662	673	111	21	4,598	
	PI	406	650	1,621	78	526	673	91	17		
	NC	77	64	235	0	136	0	20	4		
	Plan 5 (LED)	571	570	1,969	56	528	799	88	17	4,598	
	PI	96	499	1,490	58	274	799	45	9		
	NC	475	71	479	28	254	0	43	8		

TABLE A.4.1. (CONT.)

Target Year[2/]	Alternatives	Fresh/ Intermediate Marsh	Brackish Marsh	Open Water	Wooded Swamp	Bottomland Hardwoods	Levee	Pasture		Residential/ Commercial	Total Acreage Affected
1991	Without Project	648	911	2,017	74	729	0	184	35	4,598	
	Plan 1 (GDM, CF, LL&E)	0	0	660	52	490	794	2,186	416	4,598	
	PI	0	0	660	52	490	794	2,186	416		
	NC	0	0	0	0	0	0	0	0		
	Plan 2 (GDM & CF)	0	43	571	52	593	712	2,207	421	4,599	
	PI	0	0	454	52	467	712	2,179	415		
	NC	0	43	117	0	126	0	28	6		
	Plan 3 (GDM & LL&E)	65	15	672	52	490	755	2,141	408	4,598	
	PI	0	0	535	52	490	755	2,141	408		
	NC	65	15	137	0	0	0	0	0		
	Plan 4 (GDM)	65	67	573	52	593	673	2,162	413	4,598	
	PI	0	0	329	52	467	673	2,134	407		
	NC	65	67	244	0	126	0	28	6		
	Plan 5 (LED)	403	93	1,150	42	480	799	1,370	261	4,598	
	PI	0	0	621	19	241	799	1,310	250		
	NC	403	93	529	23	239	0	60	11		

TABLE A.4.1. (CONT.)

Target Year	Alternatives	Fresh/ Intermediate Marsh	Brackish Marsh	Open Water	Wooded Swamp	Bottomland Hardwoods	Levee	Pasture		Residential/ Commercial	Total Acreage Affected
1996	Without Project	550	907	2,119	61	684	0	233	45	4,599	
	Plan 1 (GDM, CF, LL&E)	0	0	660	35	431	794	2,250	428	4,598	
	PI	0	0	660	35	431	794	2,250	428		
	NC	0	0	0	0	0	0	0	0		
	Plan 2 (GDM & CF)	0	40	574	35	528	712	2,276	434	4,599	
	PI	0	0	454	35	411	712	2,240	427		
	NC	0	40	120	0	117	0	36	7		
	Plan 3 (GDM &LL&E)	55	18	679	35	431	755	2,205	420	4,598	
	PI	0	0	535	35	431	755	2,205	420		
	NC	55	18	144	0	0	0	0	0		
	Plan 4 (GDM)	55	68	582	35	528	673	2,231	426	4,598	
	PI	0	0	329	35	411	673	2,195	419		
	NC	55	68	253	0	117	0	36	7		
	Plan 5 (LED)	342	109	1,195	32	434	799	1,417	270	4,598	
	PI	0	0	621	13	210	799	1,341	256		
	NC	342	109	574	19	224	0	76	14		

TABLE A.4.1. (CONT.)

Target Year[2/]	Alternatives	Fresh/ Intermediate Marsh	Brackish Marsh	Open Water	Wooded Swamp	Bottomland Hardwoods	Levee	Pasture		Residential/ Commercial	Total Acreage Affected
2026	Without Project	206	763	2,607	18	457	0	460	88	4,599	
	Plan 1 (GDM, CF, LL&E)	0	0	660	3	185	794	2,484	472	4,598	
	PI	0	0	660	3	185	794	2,484	472		
	NC	0	0	0	0	0	0	0	0		
	Plan 2 (GDM & CF)	0	27	587	3	252	712	2,534	484	4,599	
	PI	0	0	454	3	177	712	2,463	470		
	NC	0	27	133	0	75	0	71	14		
	Plan 3 (GDM &LL&E)	21	21	710	3	185	755	2,439	464	4,598	
	PI	0	0	535	3	185	755	2,439	464		
	NC	21	21	175	0	0	0	0	0		
	Plan 4 (GDM)	21	61	623	3	252	673	2,489	476	4,598	
	PI	0	0	329	3	177	673	2,418	462		
	NC	21	61	294	0	75	0	71	14		
	Plan 5 (LED)	128	130	1,388	7	238	799	1,603	305	4,598	
	PI	0	0	621	1	89	799	1,453	277		
	NC	128	130	767	6	149	0	150	28		

TABLE A.4.2.

COMPARISON OF BASE AND FUTURE-WITH PROJECT FOR BOTH FARMS, FOR CLOVELLY FARMS ONLY, AND LL&E[1/] ONLY. (DATA BASED ON 1975 ACREAGE)

Target Year	Farm Segment	Fresh/ Intermediate Marsh	Brackish marsh	Open water	Wooded swamp	Bottomland hardwoods	Pasture/ cropland	Residential/ commercial	Levee	Total [2/] acreages
1975	Clovelly and LL&E (Base)	110	54	212	0	160	0	0	0	536
1986	FW[3/]	35	0	349	0	22	7	2	121	536
1991	FW	0	0	331	0	19	54	10	121	535
1996	FW	0	0	331	0	16	57	10	121	535
2026	FW	0	0	331	0	6	65	12	121	535
2096	FW	0	0	331	0	1	69	13	121	535
1975	Clovelly (Base)	110	0	107	0	0	0	0	0	217
1986	FW	35	0	143	0	0	0	0	39	217
1991	FW	0	0	125	0	0	44	9	39	217
1996	FW	0	0	125	0	0	44	9	39	217
2026	FW	0	0	125	0	0	44	9	39	217
2096	FW	0	0	125	0	0	44	9	39	217
1975	LL&E (Base)	0	54	105	0	160	0	0	0	319
1986	FW	0	0	206	0	22	7	2	82	319
1991	FW	0	0	206	0	19	10	2	82	319
1996	FW	0	0	206	0	16	13	2	82	319
2026	FW	0	0	206	0	6	21	4	82	319
2096	FW	0	0	206	0	1	25	5	82	319

1/ Louisiana Land and Exploration Company

2/ Totals may vary slightly due to rounding error.

3/ Future-with Project

TABLE A.4.3.

COMPARISON OF BASE AND FUTURE-WITHOUT PROJECT FOR BOTH FARMS, AND LL&E[1] ONLY AND CLOVELLY FARMS ONLY (DATA BASED ON 1975 ACREAGE)

Target Year	Farm Segment	Fresh/ Intermediate Marsh	Brackish marsh	Open water	Wooded swamp	Bottomland hardwoods	Pasture/ cropland	Residential/ commercial	Levee	Total [2] acreages
1975	Clovelly and LL&E (Base)	110	54	212	0	160	0	0	0	536
1986	FWO[3]	77	64	235	0	136	20	4	0	536
1991	FWO	65	67	244	0	126	28	6	0	536
1996	FWO	55	68	253	0	117	36	7	0	536
2026	FWO	21	61	294	0	75	71	14	0	536
2096	FWO	2	30	344	0	26	112	22	0	536
1975	Clovelly (Base)	110	0	107	0	0	0	0	0	217
1986	FWO	77	11	129	0	0	0	0	0	217
1991	FWO	65	15	137	0	0	0	0	0	217
1996	FWO	55	18	144	0	0	0	0	0	217
2026	FWO	21	21	175	0	0	0	0	0	217
2096	FWO	2	11	204	0	0	0	0	0	217
1975	LL&E (Base)	0	54	105	0	160	0	0	0	319
1986	FWO	0	46	114	0	136	20	4	0	320
1991	FWO	0	43	117	0	126	28	6	0	320
1996	FWO	0	40	120	0	117	36	7	0	320
2026	FWO	0	27	133	0	75	71	14	0	320
2096	FWO	0	10	150	0	26	112	22	0	320

[1] Louisiana Land and Exploration
[2] Total acreage may vary slightly due to rounding error.
[3] Future-without project conditions

TABLE A.4.1. (CONT.)

Target Year[2/]	Alternatives	Fresh/ Intermediate Marsh	Brackish Marsh	Open Water	Wooded Swamp	Bottomland Hardwoods	Levee	Pasture	Residential/ Commercial	Total Acreage Affected
2096	Without Project	21	353	3,202	1	165	0	720	137	4,599
	Plan 1 (GDM, CF, LL&E)	0	0	660	0	23	794	2,623	498	4,598
	PI	0	0	660	0	23	794	2,623	498	
	NC	0	0	0	0	0	0	0	0	
	Plan 2 (GDM & CF)	0	10	604	0	48	712	2,708	517	4,599
	PI	0	0	454	0	22	712	2,596	495	
	NC	0	10	150	0	26	0	112	22	
	Plan 3 (GDM &LL&E)	2	11	739	0	23	755	2,578	490	4,598
	PI	0	0	535	0	23	755	2,578	490	
	NC	2	11	204	0	0	0	0	0	
	Plan 4 (GDM)	2	30	673	0	48	673	2,663	509	4,598
	PI	0	0	329	0	22	673	2,551	487	
	NC	2	30	344	0	26	0	112	22	
	Plan 5 (LED)	13	68	1,565	0	65	799	1,754	334	4,598
	PI	0	0	621	0	11	799	1,519	290	
	NC	13	68	944	0	54	0	235	44	

A.5. State Water Quality Certificate

This section contains the correspondence between the New Orleans District, Corps of Engineers, and the Louisiana Department of Natural Resources, Office of Environmental Affairs, Water Pollution Control Division.

April 8, 1983

IN REPLY REFER TO:

Planning Division
Environmental Analysis Branch

Mr. J. Dale Givens, Administrator
Division of Water Pollution Control
Office of Environmental Affairs
P.O. Box 44066
Baton Rouge, Louisiana 70804

Dear Mr. Givens:

The U. S. Army Corps of Engineers, New Orleans District, intends to perform dredge and fill activities associated with the Larose to Golden Meadow hurricane protection project. The proposed activities and the areas affected are documented in the enclosed Public Notice and Section 404 (b)(1) Evaluation.

Copies of the four letters received in response to the Public Notice are also enclosed for your review. Issues raised by the three letters from pipeline companies have been satisfactorily resolved by our Engineering Division. The idea of water control structures raised in the letter from Mr. Joseph Vincent of the Orleans Audubon Society was originally proposed by the New Orleans District, but rejected by the project local interests. No letters were received from Federal agencies from which we infer their approval of the proposed activities.

As concluded in the Section 404 (b)(1) Evaluation, no significant adverse impacts on the environment or aquatic ecosystem would be expected as a result of dredge and fill activities. We, therefore, request that a state water quality certificate be issued for this work as required by the 1977 amendments to the Clean Water Act.

If you have any questions, please contact Mr. Jeffrey Heaton at 838-1975

Sincerely,

ORIGINAL SIGNED BY

Cletis R. Wagahoff
Chief, Planning Division

Enclosures

FRANK P. SIMONEAUX
SECRETARY
R. JIM PORTER
ASSISTANT SECRETARY

DEPARTMENT OF NATURAL RESOURCES
OFFICE OF ENVIRONMENTAL AFFAIRS
WATER POLLUTION CONTROL DIVISION

J. DALE GIVENS
ADMINISTRATOR

April 29, 1983

DNR 830414-06

Department of the Army
New Orleans District
Corps of Engineers
P.O. Box 60267
New Orleans, La. 70160

Attention: Mr. Jeffrey Heaton

Gentlemen:

RE: Proposal for a ring levee totaling approx. 43 miles in circumference which would emcompass approx. 32,400 acres. The authorized project includes floodgates on Bayou Lafourche at the upper and lower limits of the protection levee and eight multi-barreled culverts to be located at strategic locations along the levee proper. The levee will extend southward from the latitude of the Intracoastal Waterway at Larose, La. to approx. 2.0 miles south of Golden Meadow, La. a distance of approx. 26 miles. This will be the Golden Meadow Hurricane Protection Project.

We have reviewed the information of the above referenced proposal as contained in your submittal dated April 8, 1983.

Enclosed is a copy of a public notice to be published by you one time in the official state journal, the Baton Rouge STATE TIMES. (As provided for by LRS 30:1094 A(3), the cost of this publication is to be at your expense). PLEASE REQUEST THAT THE BATON ROUGE STATE TIMES FURNISH US WITH PROOF OF PUBLICATION OF THIS NOTICE.

Provided there have been no objections to your project within ten days of the date of publication, we will forward a letter of no objection and water quality certification in accordance with statutory authority contained in Louisiana Revised Statutes of 1950, Chapter 11, Part IV, Section

1024 A(3) and provisions of Section 401 of the Clean Water Act (Public Law 95-217.)

Very truly yours,

J. Dale Givens
Administrator

JDG/LW/mp
enclosure

cc: Corps of Engineers
New Orleans District
Attention: Permit Section

Coastal Zone Management
P.O. Box 44396
Baton Rouge, La. 70804

[illegible] BE RUN IN THE OFFICIAL
[illegible] OF THE STATE OF LOUISIANA

Notice is hereby given that the Department of the Army, New Orleans Corps of Engineers New Orleans, La.

has applied to the Louisiana Department of Natural Resources, Office of Environmental Affairs, Water Pollution Control Division for

a Water Quality Certification for a ring levee totaling approx. 43 miles in circumference which would encompass approx. 32,400 acres. The authorized project includes floodgates on Bayou Lafourche at the upper and lower limits of the protection levee and eight multi-barreled culverts to be located at strategic locations along the levee proper. The levee would extend southward from the latitude of the Intracoastal Waterway at Larose, La. to approx. 2.0 miles south of Golden Meadow, La. a distance of approx. 26 miles. This will be the Golden Meadow Hurricane Protection Project.

This work will require a Letter of No Objection and a Water Quality Certification in accordance with statutory authority contained in the Louisiana Revised Statutes of 1950, Title 30, Chapter 11, Part IV, Section 1094 A(3) and provisions of Section 401 of the Clean Water Act (P.L. 95-217).

Comments concerning this application can be filed with the Office of Environmental Affairs within ten days from the date of this notice using reference No. DNR 830414-06 at the following address:

Louisiana Department of Natural Resources
Office of Environmental Affairs
Division of Water Pollution Control
Post Office Box 44066, Capitol Station
Baton Rouge, La. 70804
Telephone: (504) 342-6363

J. Dale Givens

J. Dale Givens, Administrator
Water Pollution Control Division

FRANK P. SIMONEAUX
SECRETARY
BOBBY FOSTER
EXECUTIVE SECRETARY

DEPARTMENT OF NATURAL RESOURCES
OFFICE OF ENVIRONMENTAL AFFAIRS
COASTAL MANAGEMENT DIVISION

J. DALE GIVENS
ADMINISTRATOR

June 12, 1983

DNR 830414-06

Department of the Army
New Orleans District
Corps of Engineers
P.O. Box 60267
New Orleans, La. 70160

Attention: Mr. Jeffrey Heaton

Gentlemen:

RE: Proposal for seven levee segments approx. 26 miles in length which would encompass approx. 1248 acres. The levee will extend along the east side of Bayou Lafourche from the latitude of the Intracoastal Waterway at Larose, La. to approx. 2.0 miles south of Golden Meadow, La. a distance of approx. 26 miles. This will be part of the Golden Meadow Hurricane Protection Project.

This is to acknowledge receipt of "Proof of Publication" of public notice, above reference, forwarded to you with our letter dated May 16, 1983 and to advise that no complaints relative to this project have been received by this agency within the ten day period stipulated in the notice.

It is our opinion that your proposed project will not violate water quality standards of the State of Louisiana; therefore, we offer no objection to this project provided turbidity during dredging in state waters is kept to a practicable minimum, provided also the proposed project does not change historical water flows.

In accordance with statutory authority contained in the Louisiana Revised Statutes of 1950, Title 30, Chapter 11, Part IV, Section 1094 A(3) and provisions of Section 401 of the Clean Water Act (P.L. 95-217), the Office of Environmental Affairs certifies that it is reasonable to expect that water

4066 PHONE (504) 342-7863

quality standards of Louisiana provided for under Section 303 of P.L. 95-217 will not be violated.

Very truly yours,

J. Dale Givens

J. Dale Givens
Administrator

JDG/LW/mp

6. ARCHEOLOGY RESOURCES

A.6.1. Archeological investigations in the vicinity of the proposed Larose to Golden Meadow Hurricane Protection project have been conducted by Fred B. Kniffen (1941), W. G. McIntire (1958), an unpublished report (1974), Gagliano et al. (1975), Jon L. Gibson (1978), Bert F. Rader (1978), McIntire et al. (1981), Michael E. Stout and John W. Muller (1983) and David McCullough (1984). Cultural resources investigations are on-going and scheduled to be completed in FY 84 (see Table A.6.1.). The human settlement and cultural history has been outlined by Gagliano et al. (1975) and McIntire et al. (1981). Rather than summarizing their work, the reader is directed to these sources.

A.6.2. The proposed project is situated on alluvial deposits associated with the Lafourche Delta Complex (Frazier 1967). This complex was active from appproximately 3,500 years B.P. (Before Present) to the closing of Bayou Lafourche in 1904. Of particular importance to the human settlement of this area is the Bayou Blue lobe (ca. 1800-1700 B.P.) and the Bayou Lafourche lobe (ca. 500-78 B.P.).

A.6.3. Due to the recent age of the surface deposits, the earliest human occupation of this area probably does not predate the terminal Troyville or initial Coles Creek Periods (McIntire 1958, Gagliano, et al. 1975). The earlist deposits which can be identified within the vicinity of the project area consist of a series of relict natural levees. These levees, which once supported woody vegetation, have subsided to marsh level or, in some cases, to the near subsurface. The abandoned stream courses, which can be traced on the color infrared aerial photographs, support a plant community that is different from the surrounding marsh. In a few cases, underfit streams now occupy earlier abandoned channels. This early system flows east-northeast and extends from Clovelly Farms to the vicinity of Chicot Point. These courses predate the late Bayou Lafourche lobe and are probably associated with the Bayou Blue lobe. If the Bayou Blue association is accurate, these channels were active approxi-

TABLE A.6.1.

CULTURAL RESOURCES INVESTIGATIONS

LEVEE SEGMENT	STATUS OF CULTURAL RESOURCES INVESTIGATIONS
LAROSE FLOODGATE	Stout and Muller 1983
SECTION C	Field recon scheduled for FY 84
SECTION B NORTH	Field recon scheduled for FY 84
SECTION A WEST	Field recon scheduled for FY 84
GOLDEN MEADOW FLOODGATE	Rader 1978
SECTION A EAST	McIntire et al. 1981
SECTION D	Survey scheduled for FY 84
SECTION E NORTH	To be surveyed in FY 85
SOUTH	To be surveyed in FY 84
SECTION F	McIntire et al. 1981
LL&E	Gibson 1978
CLOVELLY FARMS	Gibson 1978

mately 1800-1900 years ago. The dates for this course are based on radio carbon dating of interdistributary peat deposits.

A.6.4. The first recorded site in the vicinity of the project, site (16LF1), was recorded by Kniffen in 1941, and was visited by Gibson (1978) during his cultural resources survey of the Clovelly Farms levee alinemnt. This site consists of Rangia cuneata shell and organically stained earth midden. This site will not be impacted by the proposed project.

A.6.5. In the immediate area surrounding site 16LF1, Gibson (1978) recorded seven small in situ Rangia shell middens (16LF57, 16LF58, 16LF59, 16LF60, 16LF61, 16LF62, 16LF63). These sites are located near, but outside of the project corridor, on the West Fork Bayou L'Ours natural levee, and will not be impacted by the proposed project.

A.6.6. In the vicinity of the Louisiana Land and Exploration Company (LL&E) farms, McIntire reported two sites, 16LF54 and 16LF88, in 1974 during a survey of the proposed Louisiana Offshore Oil Port. Site 16LF54 was visited by Gibson (1978), who described the site as "an earthen rangia shell midden with an associated earthen (apparently conical mound." The site is approximately 0.4 miles east of the proposed levee corridor and would not be impacted. Gibson (1978) searched, but was unable to relocate 16LF88. The site is reported to be on the Bayou Raphael natural levee. The site record indicated that it is "apparently a village or campsite with midden area." The record does not indicate a cultural association, but notes that it can only be "found in the fall or winter due to dense vegetation cover." Additional efforts will be made to relocate the site. If the site is to be impacted by the proposed project, a determination of site significance will be completed.

A.6.7. In 1975, Coastal Environments, Inc., performed a survey of archeological sites along the Gulf Intracoastal Waterway (GIWW) in Louisiana. The survey reported two sites in the vicinity of the

project, 16LF36, an earth and shell midden, and 16LF76, a buried shell midden. Neither site would be affected by the project. The waterway cuts across the earlier delta deposits, and the buried sites probably were situated on natural levee crests associated with this eariler system. The relatively large number of recorded archeological sites on the GIWW between Bayou Lafourche and Catahoula Bay are probably because the waterway parallels the general direction of levee development. Consequently, waterway construction parallelled the crests of the abandoned and now subsided natural levee.

A.6.8. Although the cultural resources survey conducted by McIntire et al. (1981) included subsurface testing, the survey failed to locate any surface or subsurface sites in the project alinement between Clovelly Farms and the GIWW. There is a potential of uncovering buried remains once extensive earth moving operations begin. This area has been identified as archeologically sensitive and would be periodically monitored by professional archeologists during construction. In addition, Corps project inspectors would be advised of the potential for buried remains.

A.6.9. One previously unrecorded archeologically site (16LF97) was discovered by McIntire et al. (1981). This site lies outside the proposed Corps levee alinement and would not be impacted by construction. Borings through the peripheral marsh indicate that the flaring edge of the midden base lies 1.0 meter below the present marsh surface. Although it was not possible to hand auger through shell midden, subsequent borings farther from the site showed a brown-amphorphous interdistributary peat 5.0 meters below the surface. This peat is associated with the relict Bayou Blue lobe course that extends east of Clovelly Farms. The peat was overlaid with about 1.5 meters of alluvial silt clay that was capped with approximately 3.5 meters of light brown fibrous peat to the marsh surface (McIntire et al. 1981). The silty clays probably represent sediments deposited by the progradation of the late Bayou Lafourche lobe, while the upper peat represents organic accumulation following subsidence of the natural levee. The presence of the late Bayou Lafourche progradation into the

area can be seen also on the aerial photographs. Although the hand auger did not penetrate to the base of the shell midden, Rangia cuneata shell fragments were found mixed with silty clay directly overlying the lower peat. If we can assume that these Rangia shell fragments are culturally derived, it is reasonable to postulate that site 16LF97 is situated on the crest of a Bayou Lafourche lobe natural levee. Traces of the levee crest can be seen on both the United States Geological Survey quadrangles and the aerial photographs. McIntire et al. (1981) reported finding two small decorated sherds which "appear to be Mississippian in age but with the possibility of extending into Coles Creek." The cultural association is consistent with the geologic dates.

A.6.10. South of the Clovelly Farms, the Corps levee alinement follows the natural levees of West Fork Bayou d' Ours and Bayou Raphael. Both streams are associated with the Bayou Lafourche lobe and are probably around 500-600 years old. Along the eastern edge of Clovelly Farms, hand augering uncovered Rangia shell at a depth of approximately 1.0 meter (Gibson 1978). These deposits did not contain artifacts and are presumed to be natural shell beds that accumulated in an interdistributary lake. Rangia shell also was also exposed in the disposal bank of the Clovelly Farms levee. Again, no artifacts were recorded.

A.6.11. The presence of Rangia shell indicates that Bayous L'Ours and Raphael were prograding across the eroded and subsided Bayou Blue lobe. The Bayou Blue interlevee flank depressions were occupied by brackish lakes and bays. As the active Bayou L'Ours and Raphael channels continued to prograde, the bays were filled with sediment and the surrounding areas probably were transformed into freshwater marsh. The presence of Rangia shell at sites 16LF97 and 16LF1 indicates the continued presence of brackish waters in the vicinity.

A.6.12. In the vicinity of the Larose Floodgate, Stout and Muller (1983) located no in situ archeological remains. Seven relatively recent standing structures were recorded during the survey. None of

these structures met the criteria for inclusion on the National Register of Historic Places. Stout and Muller did record a cultural resource of historical significance in the project imapct area, the passenger vessel "M/V Fox." The M/V Fox has been determined eligible for inclusion in the National Register. The "Fox" was pulled onto the bank as much as 50 years ago and is in deteriorating condition. The vessel's significance is based on its unique design and its contribution to local history. Alternatives to avoid adverse project impacts on the M/V Fox were investigated. No feasible and prudent alternative is available and demolition is necessary. A Memorandum of Agreement stipulating mitigation measures for the M/V Fox is now in process.

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A.7. RECREATIONAL RESOURCES

A.7.1. General.

The Larose to Golden Meadow Study Area is contained within and defined by the boundary of the southeastern Louisiana Parish of Lafourche. The natural and recreational resources of the study area provide wide and varied opportunities for outdoor recreational activities. The area is characterized by extensive fresh and brackish marsh and large lakes. Because of the excellent wildlife and fisheries habitat, hunting and fishing are the main recreational activities. Developed recreational facilities such as campgrounds, picnic areas, trails, and golf courses are very limited or completely absent because of the lack of suitable soils and topography. Support facilities such as boat launching ramps, access facilities, and retail stores are limited because construction of roads, buildings, and other structures is difficult and costly. Access is limited mainly to boats or special floating vehicles.

A.7.2. Existing Recreational Areas and Facilities.

Outdoor recreational facilities in the study area consist mostly of public and commercial boat launching ramps or slings. Additionally, there are two state wildlife management areas which offers public hunting for big game, small game, and waterfowl. Larger communities within the parish provide small-scale community parks, playgrounds, and picnic areas.

The current Louisiana State Comprehensive Outdoor Recreation Plan (SCORP) includes 1980 inventories of existing recreational areas and facilities. Table A.7.1. lists the current supply of outdoor recreational facilities of the study area by category and proprietorship, and generally characterizes each site.

TABLE A.7-1

EXISTING OUTDOOR RECREATIONAL FACILITIES INVENTORY

LAROSE TO GOLDEN MEADOW STUDY AREA

Proprietorship/Facility Name	Boat Launching Lanes	Other Amenities
State Areas		
Point-au-Chien Wildlife Management Area		29,000 Hunting Acres
Wisner Wildlife Management Area		21,621 Hunting Acres
Parish/Local Areas		
Parish Landing	1	
Bell Pass Marina	1	
Choctaw Boat Ramp	1	
Raceland Boat Ramp	3	
Lockport Boat Ramp	6	60' Fishing Pier
Lake Fields Wildlife Community Ward		1,000 Hunting Acres
Larose Boat Ramp	2	
Golden Meadow Boat Launch	2	
Public Boat Ramp	1	
Peltier Park		18 Picnic Tables
Lockport Boat Ramp	1	
Acadia Park		20 Picnic Tables
Bayouside Boat Ramp	1	
Delta Farms Boat Ramp	1	
Thibodeaux Recreation Department		5 Picnic Tables 14 Tent Camping Sites 10 Trailer Camping Spaces
Levert's Bayou Side Park	1	
Exxon Boat Ramp on Breton Canal	1	
VFW Boat Launch	1	

TABLE A.7-1 (CONTINUED)

EXISTING OUTDOOR RECREATIONAL FACILITIES INVENTORY

LAROSE TO GOLDEN MEADOW STUDY AREA

Proprietorship/Facility Name	Boat Launching Lanes	Other Amenities
Harvey Cypress Inn Boat Launch	1	75' Fishing Pier
Jog Romes Boat Ramp	1	50' Fishing Pier
Melancon Boat Launch	1	100' Fishing Pier
Scuddy Boat Launch	1	
South Louisiana Recreation Resort Inc.	1	1,035 Hunting Acres 25 Trailer Camping Spaces
Sam Foret Boat Ramp	1	
Pleasure Ponds	1	20' Fishing Pier
Charlie Hardison's Grocery	1	
B-B's Marina	1	
Leeville Trailer Park	1	
Fourchon Boat Launch	4	
Gus's Boat Launch	1	
Clovelly Farms	1	

A.7.3. Recreational Potential.

Lafourche Parish is located within State Planning Region 3 which includes five other Louisiana parishes. The entire planning region represents only about 7.6 percent of the state's total population. Because of its close proximity to the Greater New Orleans Metropolitan Area, the study area will continue to supply outdoor recreational opportunities to the populus of both urban and suburban areas. Two major landscape divisions cover the entire region - alluvial flood plain in the northern portion and coastal marsh to the south. The coastal marsh and associated estuarine areas provide millions of user-days for water-related sports and offer vast potential for future development.

A.7.4. Recreational Supply, Demand, and Need.

Recreational needs are determined by comparing demand with existing supply. The State of Louisiana's Department of Culture, Recreation, and Tourism, Division of Outdoor Recreation, Office of Program Development, conducted a statewide recreational facility inventory in 1979-1980 and a recreational demand/participation survey in 1980. An analysis of the results of these recent surveys revealed substantial recreational demands and needs for additional recreational resource and facility development within the state planning region encompassing the study area. Recreational activities reflecting the greatest demand and need for the study area are generally classified as outdoor activities, and, of these, many are natural resource oriented such as hunting and fishing.

A.7.5. Plan Alternative Assessment.

Project construction would impact both the existing and future use of lands and waters which provide opportunity for fish and wildlife oriented recreation. Project impacts generally can be classified as direct or secondary. Direct impacts result directly from project

construction, i.e., levee building, etc. Induced impacts occur as a result of the project being in place, i.e., pumping of leveed wetlands, clearing of bottomland hardwoods for agricultural, etc. Both types of impacts would, in this case, affect recreational resources from the land-use perspective. The impacts of each plan alternative are evaluated on the basis of sport hunting potential losses or gains which are incurred as a result of construction of the project.

The capacity of the land to support a given number of man-days per acre of hunting supply based upon a biological sustained harvest rate (hunting carrying capacity) can be measured and serves as an effective evaluation means of project impacts on consumptive wildlife recreation which predominates the study area. Man-days of supply were calculated by first assuming that, based upon a high market area demand, each acre of available hunting habitat afforded by the project would be used to its optimal carrying capacity for each respective hunting activity type. The hunting carrying capacity is expressed in terms of hunting man-days per acre for each habitat type and hunting activity type. Carrying capacity multiplied times the number of habitat acres yields man-days of potential hunting supply.

These man-days of supply can be translated into an overall monetary worth, based upon a unit-day value (UDV) previously derived for this region in the recreational analysis of the Louisiana Coastal Area Freshwater Diversion Study which overlaps this study area. Unit-day values were assigned to each hunting activity through the analysis of evaluation criteria and standards as prescribed in the Water Resource Council's Principles and Guidelines. The five criteria and associated measurement standards are designed to reflect quality, relative scarcity, ease of access, and esthetic features of the recreational resource to be evaluated. The evaluation of these criteria with respect to the resource yields a point value which is converted into

a corresponding specific dollar value contained in a range of UDV provided in the most current published schedule. The approved FY 83 ranges of values are:

General recreation	$1.60 - 4.80
Specialized recreation	$6.50 - 19.00

UDV's selected for use in this study are based upon a point value of 60 for each hunting activity in its respective range classification under the FY 83 schedule.

Table A.7.2. is a summary of the recreational man-days of supply and associated dollar values for each plan alternative and the comparative differences of each plan with those of the future-without project conditions.

Although the use of several existing boat launching facilities that provide access into local water bodies would be temporarily disrupted during levee construction, provisions for temporary access are being planned by the South Lafourche Parish Levee Board. Additionally, the Levee Board is planning to provide public boat access at eight pumping plants that would be constructed in conjunction with the project. These boat ramps would be constructed as time and funding permit.

TABLE A.7.2.

LAROSE TO GOLDEN MEADOW
RECREATIONAL MAN-DAY ANALYSIS

ACTIVITY TYPE	MAN-DAYS OF SUPPLY						$ VALUE (UDV)	DOLLAR VALUATION					
	FWOP	1 TSP	2 GDM & CF	3 GDM & LL&E	4 GDM	5 GDM & LL&E CF & ES		FWOP	1 TSP	2 GDM & CF	3 GDM & LL&E	4 GDM	5 GDM & LL&E CF & ES
1975													
Big Game Hunting	406	406	406	406	406	406	$14.70	$5,968	$5,968	$5,968	$5,968	$5,968	$5,968
Small Game Hunting	1,155	1,155	1,155	1,155	1,155	1,155	4.10	4,736	4,736	4,736	4,736	4,736	4,736
Waterfowl Hunting	878	878	878	878	878	878	14.70	12,907	12,907	12,907	12,907	12,907	12,907
TOTAL	2,439	2,439	2,439	2,439	2,439	2,439		23,611	23,611	23,611	23,611	23,611	23,611
Big Game Hunting	13	1	2	2	2	6	14.70	191	15	29	29	44	88
Small Game Hunting	309	465	486	462	487	349	4.10	1,230	1,907	1,993	894	1,997	1,431
Waterfowl Hunting	147	0	4	5	12	26	14.70	2,161	0	59	74	176	383
TOTAL	469	466	492	469	502	381		3,582	1,922	2,081	1,997	2,217	1,902
Difference Between Years 1975-2096	-1,970	-1,973	-1,947	-1,970	-1,937	-2,058		-20,029	-21,689	-21,530	-21,614	-21,394	-21,709
Difference Between FWOP + FWP Year 2096		+6	+32	+9	+42	-79			-1,660	-1,501	-1,585	-1,365	-1,680

Abbreviations

FWOP - Future-Without Project
TSP - Tentatively Selected Plan
GDM - General Design Memorandum Alinement
CF - Clovelly Farms
LL&E - Louisiana Land and Exploration
ES - E south Alternative
UDV - Unit Day Value

SECTION A.8.

TABLE A.8.1.

FUR CATCH AND VALUE

Species	Marsh Type: Fresh/Intermediate	Marsh Type: Brackish
Muskrat		
Average catch/acre[a/]	0.09[b/]	0.08
Value/pelt[c/]	$5.43	$5.43
Value/acre	$0.488	$0.46
Nutria		
Average catch/acre	0.40[b/]	0.09
Value/pelt	$7.39	$7.39
Value/acre	$2.15	$0.64
Mink		
Average catch/acre	0.0015[b/]	0.001
Value/pelt	$13.67	$13.67
Value/acre	$0.02	$0.015
Otter		
Average catch/acre	0.0005[b/]	0.0002
Value/pelt	$44.55	$44.55
Value/acre	$0.02	$0.01
Raccoon		
Average catch/acre	0.009[e/]	0.01[e/]
Value/pelt	$11.46	$11.46
Value/acre	0.11	0.09
TOTAL		
Average catch/acre	0.50	0.18
Gross value/acre	$3.57	$1.21
Net Value/acre[f/]	$2.68	$0.91

a/ Average catch per acre, unless otherwise noted, from Palmisano (1973).

b/ Represents mean of fresh and intermediate marsh average harvest/acre.

c/ Based on a 1976-81 running average of prices received by the trapper, expressed in 1981 dollars using the CPI Index for Hides, Skins, Leather, and Related Products.

d/ Represents one-half of the combined maximum production for fresh and intermediate marsh types.

e/ Represents one-half the maximum value.

f/ Cost of harvest is 25% of gross returns.

SECTION A.9.

TABLE A.9.1

PRIMARY AMBIENT AIR QUALITY STANDARDS

Air Contaminant	Standard Maximum Permissible Concentration
Suspended Particulate	75ug/m^3 (Annual geometric mean) 260 ug/m^3 (Maximum 24-hour concentration not to be exceeded more than once per year)
Sulfur Dioxide (SO_2)	80 ug/m^3 or 0.03 ppm (annual arithmetic mean) 365 ug/m^3 or 0.14 ppm (Maximum 24-hour concentra- tion not to be exceeded more than once per year)
Carbon Monoxide (CO)	10,000 ug/m^3 or 9ppm (Maximum 8-hour concentration not to be exceeded more than once per year) 40,000 ug/m^3 or 35 ppm (Maximum 1-hour concentration not to be exceeded more than once per year)
Ozone	235 ug/M^1 (0.12 ppm). The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm (235 micrograms (ug)/M^1) is equal to, or less than, one as determined by 40 CFR 50 Appendix H.
Nitrogen Dioxide (NO_2)	100 ug/m^3 (0.05 ppm) (annual arithmetic mean)

SOURCE: Louisiana Air Pollution Regulations

APPENDIX B

CONSISTENCY DETERMINATION

LOUISIANA COASTAL ZONE
MANAGEMENT PROGRAM

APPENDIX B

CONSISTENCY DETERMINATION
LOUISIANA COASTAL ZONE MANAGEMENT PROGRAM

1. Introduction

Section 307 of the Coastal Zone Management Act (CZM) of 1972, 16 U.S.C. 1451 et seq requires that "each Federal agency conducting or supporting activities directly affecting the coastal zone shall conduct or support those activities in a manner which is, to the maximum extent praticable, consistent with approved state management programs." In accordance with Section 307, a consistency determination has been made for the Larose to Golden Meadow Hurricane Protection Levee Project. Coastal Use Guidelines were written in order to implement the policies and goals of the Louisiana Coastal Resources Program, and serve as a set of performance standards for evaluating projects or proposals on their individual merits for compliance with the guidelines. Compliance with the Louisiana Coastal Resources Program, and therefore Section 307, requires compliance with applicable Coastal Use Guidelines. A determination of the consistency of the project with the guidelines is presented in the following text.

B.2. History and Project Description

B.2.1. In the early 1960's, local interests in Lafourche Parish constructed a low-ring levee from Larose to the vicinity of Golden Meadow. The levee was approximately 40 arpents from Bayou Lafourche and was drained by several low-lift pumps. They then requested Federal help in bringing the levee to a height to provide hurricane protection. In 1965, Congress authorized the raising of the local levee, construction of two navigable floodgates in Bayou Lafourche, and installation of

seven multi-barrelled culverts for interior drainage. At the request of local interests, pumping stations replaced the culverts and the l ee was realined to extend two miles south of Golden Meadow. The realinement inclosed approximately 2,700 ares of marsh/ponds. In 1974, a Final Environmental Impact Statement was filed with the Council on Environmental Quality. In December 1974, a Section 404 Public Notice was issued and in their comments, the US Fish and Wildlife Service and National Marine Fisheries Service recommended changes in levee alinements in two reaches. In Section C South, the Corps of Engineers decided realinement was prohibitively expensive. In Section A East, the alinement that impacted 2,700 acres of marsh/pond was changed to impact the least amount of marsh/pond practicable (1,217 acres), and the Corps began to develop a mitigation plan. In 1975, construction began on the Federal project, and most first lifts have been completed on the west side. Local interests have requested that the Federal project be expanded to include two privately leveed agricultural properties on the east side of Bayou Lafourche. The EIS supplement analyzes the impacts of such work.

B.2.2. In summary, the Federal action consists of upgrading a local protection levee system extending from the Intracoastal Waterway at Larose, Louisiana, to 2 miles south of Golden Meadow, Louisiana; construction of floodgates on Bayou Lafourche at the upper and lower limits of the protection levee; and installation of pumping stations. The finished levee system would have a net grade elevation of 13.0 feet National Geodeic Verticle Datum (NGVD) at Golden Meadow and would vary to 8.5 feet NGVD near Larose, Louisiana.

B.2.3. The proposed mitigation plan consists of construction of 7 miles of low earthen levee (+4 NGVD) along Cutoff Canal, Grand Bayou, and Grand Bayou Canal. Two water-control structures also would be

constructed in Grand Bayou and one in Cutoff Canal (see Draft Supplemental Environmental Impact Statement (DSEIS) Plate 3). The majority of the mitigation area is in Pointe au Chien Wildlife Management Area. This mitigation plan has been developed in conjunction with the US Fish and Wildlife Service and the Louisiana Department of Wildlife and Fisheries. It has been approved by the South Lafourche Levee District.

B.2.4. This Consistency Determination will consider work remaining to be done on the ring levee [C North, F, E North, E South, D, A East, Clovelly Farms, and LL&E (see DSEIS Plate 6)] and the mitigation plan. Acreages quoted will be slightly different from the accompanying DSEIS because impacts in completed Sections C South & A East will not be considered. Impacts of these reaches are discussed in the DSEIS because they were not analyzed in the 1974 Final EIS, and because they must be considered in the mitigation analysis.

B.3. **Guidelines**

1. GUIDELINES APPLICABLE TO ALL USES

Guideline 1.1-1.6: Acknowledged.

Guideline 1.7 It is the policy of the coastal resources program to avoid the following adverse impacts. To this end, all uses and activities shall be planned, sited, designed, constructed, and operated and maintained to avoid to the maximum extent practicable significant:

Guideline 1.7 (a) Reductions in the natural supply of sediment and nutrients to the coastal system by alterations of freshwater flow.

Response 1.7 (a): The blocking of four canals by the levee would alter freshwater flow but would not significantly reduce sediment and nutrient

flows because these canals presently carry only minor amounts of such materials. The proposed pumping stations would export sediment and nutrients to the external system when they operate. The proposed water-control structures would not impact flow of sediment of nutrients.

Guideline 1.7 (b) Adverse economic impacts on the locality of the use and affected governmental bodies.

Response 1.7 (b): Adverse economic impacts of the tentatively selected plan would be limited to the burden of 30 percent of the construction costs and all operation and maintenance costs. However, the hurricane protection levee would provide substantial protection to life and property. The benefit cost ratio of this project is 4.7 to 1.

Guideline 1.7 (c) Detrimental discharges of inorganic nutrient compounds into coastal waters.

Response 1.7 (c): Temporary eutrophic conditions due to increased nutrient supplies accompanying dredging activities may occur in certain local waterways. These conditions would dissipate quickly.

Guideline 1.7 (d) Alterations in the natural concentration of oxygen in coastal waters.

Response 1.7 (d): Possible short-term and long-term oxygen deficits could be expected in waterways adjacent to the levee alinements. Short-term deficits induced by resuspension of highly organic sediments, poor circulation, increased turbidities and consequent reductions in photosynthesis, could occur in waterways immediately adjacent to construction operations. Long-term impacts could include lower DO levels due to alteration in the hydrologic regime caused by the levees blocking existing canals. The duration and severity of oxygen deficits

would be dependent on numerous factors including season, precipitation, tidal effects, and climatology.

Guideline 1.7 (e) Destruction or adverse alterations of streams, wetland, tidal passes, inshore waters and water bottoms, beaches, dunes, barrier islands, and other natural biologically valuable areas or protective coastal features.

Response 1.7 (e): The tentatively selected plan would impact approximately 1,030 acres of fresh to brackish marsh, 727 acres of bottomland hardwoods, 141 acres of wooded swamp, and 630 acres of open water. When compared to future-without project conditions, only about 300 acres of wetlands would be lost. Construction of the mitigation plan levee would destroy 73 acres of marsh and 9 acres of open water. However, implementation of the mitigation plan would stabilize water levels and moderate salinity flucuations within a 4,598 acre pond/marsh area. This mitigation plan should provide a more stable environment for fish and wildlife communities, and thereby promote biological productivity within this area. The mitigation plan would compensate for the habitat lost due to levee raising activities.

Guideline 1.7 (f) Adverse disruption of existing social patterns.

Response 1.7 (f): Adverse disruptions of existing social patterns associated with the tentatively selected plan would be confined to the relocation of approximately eight residences and some commercial establishments.

Guideline 1.7 (g) Alterations of the natural temperature regime of coastal waters.

Response 1.7 (g): The temperature regime would not be altered significantly due to project construction or mitigation.

Guideline 1.7 (h) Detrimental changes in existing salinity regimes.

Response 1.7 (h): Salinities within the leveed areas would be expected to decrease from their presently low levels. Salinities in the areas outside the project would not be significantly affected. Salinities in the mitigation area would be lowered, which would improve fish and wildlife productivity.

Guideline 1.7 (i) Detrimental changes in littoral and sediment transport processes.

Response 1.7 (i): No significant changes expected.

Guideline 1.7 (j) Adverse effects of cumulative impacts.

Response 1.7 (j): Construction of the tentatively selected plan would result in the loss of 1,050 acres of marsh and 630 acres of open water; and construction of the mitigation plan would eliminate 73 acres of marsh. This loss, combined with past agricultural clearing and residential and commercial development, would have a negative cumulative impact on the areas' biological productivity and esthetic value. However, without-project, marsh habitat would be lost due to subsidence and saltwater intrusion and as described above, compared to future-without project conditions, only about 300 acres of wetlands would be lost. The mitigation plan would compensate for this loss.

Guideline 1.7 (k) Detrimental discharges of suspended solids into coastal waters, including turbidity resulting from dredging.

Response 1.7 (k): With the exception of waterways intersected by the initial fill material, increases in turbidity levels should be localized and only affect areas immediately adjacent to the borrow ditches and levee rights-of-way. As the borrow canals are to be principally located

inside the leveed area, reduced transport potential exists for the highly turbid effluent waters, thus reducing potentially impacted areas. Floodside runoff would increase suspended particulates in the immediate marsh areas adjacent to the construction areas, but because of dense marsh vegetation, should result in only a minor net transport potential.

In areas where floodside borrow canals would exist (LL&E and Clovelly Farm Segments), and at major waterway crossing locations, increased transport potential would exist for the highly turbid effluent waters anticipated from disposal and effluent runoff. As a result of the transport, turbid water conditions could result for minor distances away from the actual disposal activities. The extent of impacted areas would depend on the resulting water circulation patterns and ambient turbidity concentrations.

The most significant impacts associated with increased suspended particulates would be realized during the first lift of the levee construction.

Guideline 1.7 (1) Reductions or blockage of water flow or natural circulation patterns within or into an estuarine system or a wetland forest.

Response 1.7 (1): Levee construction associated with the tentatively selected plan would block four principal waterways, and some other minor waterways and drainage systems:

- o Unnamed Oil & Gas Canals (LL&E Farm Segment)
- o Breton Canal (Sections D and E)
- o Bayou de la Roche (Section E)

o Scully Canal-lateral drainage around Clovelly Farms (Clovelly Farm Section)

The mitigation plan would block several small bayous which provide shallow-water access into the mitigation area via Grand Bayou.

Guideline 1.7 (m) Discharges of pathogens or toxic substances into coastal waters.

Response 1.7 (m): No new discharge of pathogens would occur. A moderate hazard level for toxic metal releases as a result of disposal activities is possible.

Guideline 1.7 (n) Adverse alteration or destruction of archeological, historical or other cultural resources.

Response 1.7 (n): The cultural resources investigations are ongoing and are scheduled to be completed in FY 84. The following sites have been recorded in or near the proposed alinement: X162F1 (possible site), 16LF1, 16LF57, 16LF58, 16LF59, 16LF60,16LF61, 16LF62, 16LF63, and 16LF88. Project specific impacts and National Register eligibility will be determined as part of our continuing studies.

Guideline 1.7 (o) Fostering of detrimental secondary impacts in undisturbed or biologically highly productive wetland areas.

Response 1.7 (o): Implementation of the proposed project would result in the drainage of approximately 650 acres of marsh and 122 acres of wooded swamp inclosed by the hurricane protection levee. The mitigation plan would compensate for this loss.

Guideline 1.7 (p) Adverse alteration or destruction of unique or valuable habitats, critical habitat for endangered species, important wildlife or fishery breeding or nursery areas, designated wildlife management or sanctuary areas, or forestlands.

Response 1.7 (p): The tentatively selected plan would not adversely impact any critical habitat for endangered species. Approximately 1,050 acres of marsh and 630 acres of open-water habitat which serve as fishery breeding and nursery areas would be filled or enclosed with the levee system so as to exclude future use by estuarine-dependent organisms. In addition, approximately 73 acres of marsh and 9 acres of open water within the Pointe au Chien Wildlife Management Area (WMA) would be eliminated as part of the construction associated with the mitigation plan. The mitigation plan would compensate for project losses by stabilizing salinities and water levels within a 4,598-acre marsh/pond area in the WMA and insure its continued use by fish and wildlife organisms.

Guideline 1.7 (q) Adverse alteration or destruction of public parks, shoreline access points, public works, designated recreation areas, scenic rivers, or other areas of public use and concern.

Response 1.7 (q): Implementation of the TSP would block four major waterways which provide access to outlying marshes for recreational and commercial fishermen and trappers. Also, shoreline access at Larose, Louisiana, along the GIWW would be blocked by the Larose floodwall. The levee and three water-control structures proposed for construction on the east side of the mitigation area would block fishermen access into the mitigation area via several small bayous. Boat launch ramps would be constructed at several major waterways blocked by the hurricane protection levee.

Guideline 1.7 (r) Adverse disruptions of coastal wildlife and fishery migratory patterns.

Response 1.7 (r): The tentatively selected plan would not disrupt any known coastal wildlife or fishery migratory patterns.

Guideline 1.7 (s) Land loss, erosion and subsidence.

Response 1.7 (s): This project would not increase land loss, erosion, or subsidence appreciably.

Guideline 1.7 (t) Increases in the potential for flood, hurricane or other storm damage, or increases in the likelihood that damage will occur from such hazards.

Response 1.7 (t): The tentatively selected plan would provide increased protection for the residents of Larose and Golden Meadow from hurricane and high-water surges.

Guideline 1.7 (u) Reductions in the long term biological productivity of the coastal ecosystem.

Response 1.7 (u): Implementation of the tentatively selected plan would result in the permanent loss of approximately 1,050 acres of marsh, 727 acres of bottomland hardwoods and 141 acres of wooded swamp. These areas contribute significantly to the inshore and offshore estuarine fishery. Implementation of the mitigation plan would stabilize salinities and water levels within a 4,598-acre marsh/pond area. The management of the mitigation area through water-level control (water-control structures) would stimulate growth of floating aquatics, reduce shoreline and marsh erosion, and stablize salinity fluctuations resulting from normal and extreme high tides (storm events) or drought conditions in the marsh. The mitigation plan would not prevent

saltwater intrusion as a result of hurricane tidal surges, but it would greatly reduce the volume of saline water which would enter the mitigation area. By reducing the wide flucuation of salinity and controlling water levels within the mitigation area, wildlife and fish productivity would be enhanced.

Guideline 1.8 In those guidelines in which the modifier "maximum extent practicable" is used, the proposed use is in compliance with the guideline if the standard modified by the term is complied with. If the modified standard is not complied with, the use will be in compliance with the guideline if the permitting authority finds, after a systematic consideration of all pertinent information regarding the use, the site and the impacts of the use as set forth in Guideline 1.6, and a balancing of their relative significance, that the benefits resulting from the proposed use would clearly outweigh the adverse impacts resulting from noncompliance with the modified standard and there are no feasible and practical alternative locations, methods and practices for the use that are in compliance with the modified standard and:

a. significant public benefits will result from the use, or;

b. the use would serve important regional, state or national interests, including the national interest in resources and the siting of facilities in the coastal zone identified in the coastal resources program, or;

c. the use is coastal water dependent.

Response 1.8: Acknowledged.

Guideline 1.9 Uses shall to the maximum extent practicable be designed and carried out to permit multiple concurrent uses which are appropriate for the location and to avoid unnecessary conflicts with other uses of the vicinity.

Response 1.9: Acknowledged.

Guideline 1.10 These guidelines are not intended to be, nor shall they be, interpreted to allow expansion of governmental authority beyond that established by La. R.S. 49:213.1 through 213.21, as amended; nor shall these guidelines be interpreted so as to require permits for specific uses legally commenced or established prior to the effective date of the coastal use permit program nor to normal maintenance or repair of such uses.

Response 1.10: Acknowledged.

2. GUIDELINES FOR LEVEES

Guideline 2.1 The leveeing of unmodified or biologically productive wetlands shall be avoided to the maximum extent practicable.

Response 2.1: The tentatively selected plan has to the maximum extent practicable been designed to avoid highly productive wetland areas. However, some wetland marsh and open-water areas would be impacted under this plan. The proposed mitigation plan compensates for this loss. The levee alinement in the already completed A East reach was altered so as to exclude 1,500 acres of wetlands. An alternative that excluded 586 acres of marsh and 387 acres of forested wetlands was analyzed. However, this alinement increased the cost of the project by $4.3 million and was, thus, not selected.

Guideline 2.2 Levees shall be planned and sited to avoid segmentation of wetland areas and systems to the maximum extent practicable.

Response 2.2: The tentatively selected levee alinement has been designed to avoid segmentation of wetlands to the maximum extent practicable.

Guideline 2.3 Levees constructed for the purpose of developing or otherwise changing the use of a wetland area shall be avoided to the maximum extent practicable.

Response 2.3: The tentatively selected plan was designed in the early 1970's to provide hurricane protection for an area extending from Larose to Golden Meadow, by upgrading a previously constructed levee. The local levee inclosed 1,591 acres of marsh and forested wetlands in an era when the value of such wetlands was not generally recognized. Subsequently, the local assuring agency has requested inclosure of additional wetlands. As explained in Para. B.2.1., the request to inclose 2,700 acres of marsh/pond (740 of which was marsh) in the now completed A East reach was turned down at the insistance of the US Fish and Wildlife Service and National Marine Fisheries Service. It is felt that the amount of inclosed marsh has been reduced to the maximum extent practicable. The proposed mitigation plan compensates for this marsh loss.

Guideline 2.4 Hurricane and flood protection levees shall be located at the nonwetland/wetland interface or landward to the maximum extent practicable.

Response 2.4: The proposed protection levees would be located as near to the nonwetland/wetland interface as practicable.

Guideline 2.5 Impoundment levees shall only be constructed in wetland areas as part of approved water or marsh management projects or to prevent release of pollutants.

Response 2.5: The proposed mitigation would involve constructing an impoundment levee for the intended purpose of marsh management. The alinement has been coordinated with the Louisiana Department of Wildlife and Fisheries.

Guideline 2.6 Hurricane or flood protection levee systems shall be designed, built and thereafter operated and maintained utilizing best practical techniques to minimize disruptions of existing hydrologic patterns, and the interchange of water, beneficial nutrients and aquatic organisms between inclosed wetlands and those outside the levee system.

Response 2.6: The proposed levee system would, to the extent practicable, avoid disruption of existing hydrologic patterns. However, several bayous and canals would be blocked off; this impact would be unavoidable. Aquatic habitat (fresh-brackish marsh and open water) inclosed within the protection levee would be drained, and most existing interchange of water, nutrients, and aquatic organisms with outside aquatic environments would be terminated. The floodgates on Bayou Lafourche would remain open except prior to and during hurricanes.

3. GUIDELINES FOR LINEAR FACILITIES

Response 3: Not applicable.

4. GUIDELINES FOR DREDGED SPOIL DEPOSITION

Response 4: Not applicable.

5. GUIDELINES FOR SHORELINE MODIFICATION

Response 5: Not applicable.

6. GUIDELINES FOR SURFACE ALTERATIONS

Guideline 6.1 Industrial, commercial, urban, residential, and recreational uses are necessary to provide adequate economic growth and development. To this end, such uses will be encouraged in those areas of the coastal zone that are suitable for development. Those uses shall be consistent with the other guidelines and shall, to the maximum extent practicable, take place only:

a. on lands 5 feet or more above sea level or within fast lands; or

b. on lands which have foundation conditions sufficiently stable to support the use, and where flood and storm hazards are minimal or where protection from these hazards can be reasonably well achieved, and where the public safety would not be unreasonably endangered; and

(1) the land is already in high intensity of development use, or

(2) there is adequate supporting infrastructure, or

(3) the vicinity has a tradition of use for similar habitation or development.

Response 6.1: The tentatively selected plan would provide hurricane flood protection for existing residential and commercial businesses located within the project area. The enclosed wetlands that would be

developed for residential and commercial purposes are generally within 40 arpents of the Bayou - a "traditional" area for development in coastal Louisiana.

Guideline 6.2 Public and private works projects such as levees, drainage improvements, roads, airports, ports, and public utilities are necessary to protect and support needed development and shall be encouraged. Such projects shall, to the maximum extent practicable, take place only when:

a. they protect or serve those areas suitable for development pursuant to Guideline 6.1; and

b. they are consistent with the other guidelines; and

c. they are consistent with all relevant adopted state, local and regional plans.

Response 6.2: The project would provide flood protection for existing residential and commercial development and support additional development within the project area.

Guideline 6.3 BLANK (Deleted)

Guideline 6.4 To the maximum extent practicable wetland areas shall not be drained or filled. Any approved drain or fill project shall be designed and constructed using best practical techniques to minimize present and future property damage and adverse environmental impacts.

Response 6.4: The tentatively selected plan would eliminate approximately 1,050 acres of marsh, 141 acres of wooded swamp, 727 acres of bottomland hardwoods and 630 acres of open-water habitat. These

impacts are unavoidable and have been reduced to the maximum extent practicable. Impacts would be compensated for by the proposed mitigation plan.

Guideline 6.5 Coastal water dependent uses shall be given special consideration in permitting because of their reduced choice of alternatives.

Response 6.5: Not applicable.

Guideline 6.6 Areas modified by surface alteration activities shall, to the maximum extent practicable, be revegetated, refilled, cleaned and restored to their predevelopment condition upon termination of the use.

Response 6.6: Upon completion of each levee lift, the area would be compacted, shaped, and vegetated in grasses.

Guideline 6.7 Site clearing shall to the maximum extent practicable, be limited to those areas immediately required for physical development.

Response 6.7: Levee raising activities would be done in such a manner as to clear only those areas necessary to accommodate the proposed protection levee.

Guideline 6.8 Surface alterations shall, to the maximum extent practicable, be located away from critical wildlife areas and vegetation areas. Alterations in wildlife preserves and management areas shall be conducted in strict accord with the requirements of the wildlife management body.

Response 6.8: Construction impacts associated with the tentatively selected plan would not impact any wildlife preserves or management areas. However, the proposed mitigation plan calls for the construction of a levee 7 miles in length, located in the Pointe au Chien Wildlife Management Area. The intended purpose of the mitigation plan is to

compensate for wetland habitat loss due to levee construction by reducing saltwater intrusion into a 4,598-acre area located within the management area. Through the use of a levee and three water-control structures, salinity fluctuations and water levels within the mitigation area would be moderated, thereby reducing marsh loss and stimulating the growth of floating aquatics. The moderations of salinities and water level extremes within this area would promote fish and wildlife usage and productivity.

Guideline 6.9 Surface alterations which have high adverse impacts on natural functions shall not occur, to the maximum extent practicable, on barrier islands and beaches, isolated cheniers, isolated natural ridges or levees, or in wildlife and aquatic species breeding or spawning areas, or in important migratory routes.

Response 6.9: The tentatively selected plan would not impact any barrier islands, beaches, or isolate cheniers. Approximately 1,800 acres of wetland and aquatic habitat which is suitable for fishery spawning and/or nursery areas would be impacted. The proposed mitigation plan would compensate for this loss.

Guideline 6.10 The creation of low dissolved oxygen conditions in the water or traps for heavy metals shall be avoided to the maximum extent practicable.

Response 6.10: Levee raising activities would result in elevated turbidity levels in aquatic environments immediately adjacent to the work site. Increased turbidity levels could lead to a slight reduction in dissolved oxygen levels in turbidity-affected acres. This impact would be short termed and minor.

Guideline 6.11 Surface mining and shell dredging shall be carried out utilizing the best practical techniques to minimize adverse environmental impacts.

Response 6.11: Not applicable.

Guideline 6.12 The creation of underwater obstructions which adversely affect fishing or navigation shall be avoided to the maximum extent practicable.

Response 6.12: The proposed hurricane protection levee does not include any underwater structures or weirs which would affect fishing or navigation. However, the proposed mitigation plan does propose the placement of three water-control structures in association with a 7-mile-long levee. The placement of these structures would block several small bayous which provide access into the mitigation area.

Guideline 6.13 Surface alteration sites and facilities shall be designed, constructed, and operated using the best practical techniques to prevent the release of pollutants or toxic substances into the environment and minimize other adverse impacts.

Response 6.13: Limited testing indicates that implementation of the tentatively selected plan could involve the release of some heavy metals during levee construction.

Guideline 6.14 To the maximum extent practicable only material that is free of contaminants and compatible with the environmental setting shall be used as fill.

Response 6.14: Fill material required to construct the protection levee would be obtained from on-site borrow pits.

7. GUIDELINES FOR HYDROLOGIC AND SEDIMENT TRANSPORT MODIFICATIONS

Guideline 7.1 The controlled diversion of sediment-laden waters to initiate new cycles of marsh building and sediment nourishment shall be encouraged and utilized whenever such diversion will enhance the viability and productivity of the outfall area. Such diversions shall

incorporate a plan for monitoring and reduction and/or amelioration of the effects of pollutants present in the freshwater source.

Response 7.1: Not applicable.

Guideline 7.2 Sediment deposition systems may be used to offset land loss, to create or restore wetland areas or enhance building characteristics of a development site. Such systems shall only be utilized as part of an approved plan. Sediment from these systems shall only be discharged in the area that the proposed use is to be accomplished.

Response 7.2: Not applicable.

Guideline 7.3 Undesirable deposition of sediments in sensitive habitat or navigation areas shall be avoided through the use of the best preventive techniques.

Response 7.3: Not applicable.

Guideline 7.4 The diversion of freshwater through siphons and controlled conduits and channels, and overland flow to offset saltwater intrusion and to introduce nutrients into wetlands shall be encouraged and utilized whenever such diversion will enhance the viability and productivity of the outfall area. Such diversions shall incorporate a plan for monitoring and reduction and/or amelioration of the effects of pollutants present in the freshwater source.

Response 7.4: Not applicable.

Guideline 7.5 Water or marsh management plans shall result in an overall benefit to the productivity of the area.

Response 7.5: Implementation of the mitigation plan would result in the manipulation of water levels within a 4,598-acre area in the Pointe au Chien Wildlife Management Area. Stabilizing water levels, should result in a decline in salinity levels, improve waterfowl habitat, and increase the fur trapping harvest.

Guideline 7.6 Water control structures shall be assessed separately based on their individual merits and impacts and in relation to their overall water or marsh management plan of which they are a part.

Response 7.6: The mitigation plan as proposed would consist of constructing three water-control structures. The placement of these structures would allow the exchange of water and nutrients between the marsh and adjacent open water. However, the design of these structures would allow for marsh management through water level control.

Guideline 7.7 Weirs and similar water control structures shall be designed and built using the best practical techniques to prevent "cut arounds," permit tidal exchange in tidal areas, and minimize obstruction of the migration of aquatic organisms.

Response 7.7: The water-control structures as designed would prevent "cut arounds" and allow tidal exchange between the marsh and adjacent open water. The migration of aquatic organisms between the marsh and open water would be only hampered by the organisms' unwillingness to pass through or over the structure.

Guideline 7.8 Impoundments which prevent normal tidal exchange and/or the migration of aquatic organisms shall not be constructed in brackish and saline areas to the maximum extent practicable.

Response 7.8: The construction of the water-control structures (weirs) as proposed in the mitigation plan would allow surface tidal exchange.

Guideline 7.9 Withdrawal of surface and ground water shall not result in saltwater intrusion or land subsidence to the maximum extent practicable.

Response 7.9: Not applicable.

8. GUIDELINES FOR DISPOSAL OF WASTES

Response 8: Not applicable.

9. GUIDELINES FOR USES THAT RESULT IN THE ALTERATION OF WATER DRAINING INTO COASTAL WATERS

Response 9: Not applicable.

10. GUIDELINES FOR OIL, GAS, AND OTHER MINERAL ACTIVITIES

Response 10: Not applicable.

B.4. **Consistency Determination**

Based on this evaluation, the New Orleans District, US Army Corps of Engineers, has determined the implementation of the Larose to Golden Meadow Hurricane Protection Project is consistent, to the maximum extent practicable, with the State of Louisiana's approved Coastal Zone Management Program.

APPENDIX C

DRAFT FISH AND WILDLIFE COORDINATION ACT REPORT

LAROSE TO GOLDEN MEADOW, LOUISIANA
HURRICANE PROTECTION PROJECT

DRAFT FISH AND WILDLIFE COORDINATION ACT REPORT

SUBMITTED TO

NEW ORLEANS DISTRICT
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

PREPARED BY

DAVID M. SOILEAU, SENIOR FIELD BIOLOGIST

UNDER THE SUPERVISION OF

DAVID W. FRUGE, FIELD SUPERVISOR
DIVISION OF ECOLOGICAL SERVICES
LAFAYETTE, LOUISIANA

MARCH 1983

United States Department of the Interior

FISH AND WILDLIFE SERVICE

March 25, 1983

District Engineer
U.S. Army Corps of Engineers
P.O. Box 60267
New Orleans, Louisiana 70160

Dear Sir:

Attached is a draft Fish and Wildlife Coordination Act Report (CAR) for the Larose to Golden Meadow, Louisiana, Hurricane Protection Project transmitted to you under the authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). The draft report is being coordinated with the Louisiana Department of Wildlife and Fisheries and the National Marine Fisheries Service. Comments provided by those agencies will be incorporated into the final CAR.

Although past project modifications have resulted in a slight reduction in adverse impacts to fish and wildlife wetland habitats, with the currently proposed levee plan nearly 4,600 acres of marsh, forested wetlands, and open water would still be enclosed and subject to drainage and development. Accordingly, we are recommending that the full extent of these unavoidable project-induced losses of fish and wildlife resources be mitigated via a structural plan for water management on a portion of the State-owned Pointe-au-Chien Wildlife Management Area, as discussed in detail in the report. In view of the fact that the remaining portion of that Wildlife Management Area, not included within the proposed mitigation area, would continue to deteriorate at an ever increasing rate, we are also recommending that a program be developed to enhance the remainder of the Management Area. Such enhancement is provided for via the Federal Water Project Recreation Act, Public Law 89-72, as amended. We plan to include details of this enhancement program in our final CAR on this project.

We trust that this report will be responsive to your needs and we look forward to continued close coordination with your staff on this project.

Sincerely yours,

David W. Fruge
Field Supervisor

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EXECUTIVE SUMMARY

The Larose to Golden Meadow, Louisiana, Hurricane Protection Project was authorized by Public Law 89-298, 89th Congress, on October 27, 1965. Although certain variations in the authorized levee alignment have occurred during advanced project planning, the present plan provides for the enlargement of existing non-Federal levees and the construction of new levees for a distance of approximately 41 miles around the Bayou Lafourche ridge from Larose, Louisiana, to approximately 2 miles south of Golden Meadow, Louisiana. Nearly 4,600 acres of marsh, forested wetlands, and open water would be enclosed by the levee and subject to drainage and development.

A habitat-based analysis (i.e., Habitat Evaluation Procedures analysis) of project impacts to fish and wildlife resources indicated a net annualized loss of 82,931 habitat units. Measured in conventional, monetary terms, the project would cause an average annual loss of 540,000 pounds of commercial fishery harvest valued at over $133,000; 3,286 man-days of sport fishing valued at nearly $13,000; nearly 930 man-days of sport hunting valued at over $8,000; over $2,500 in fur harvest; and over $1,800 in wildlife-oriented recreation.

Various recommendations for project modifications which, if adopted, could virtually eliminate adverse impacts to fish and wildlife resources were identified in past FWS letter reports and are again listed at the end of this report. However, in recognition that project construction may follow the plan presently proposed, the FWS is recommending that unavoidable adverse impacts to fish and wildlife resources be fully mitigated concurrently with construction of the hurricane protection project via implementation of a water management plan on the State-owned Pointe-au-Chien Wildlife Management Area.

The Pointe-au-Chien Wildlife Management Area lies just west of the project area and, as in the case with most coastal Louisiana wetlands, is deteriorating rapidly from saltwater intrusion and subsidence. The area is sorely in need of a water management program which would halt, or at least retard, the rapid rate of wetland loss. Such a program, if properly designed, constructed, operated, and maintained, could increase and/or maintain the habitat value of the area to fish and wildlife resources above that which would be expected in the future if no management program were implemented. The benefit in increased habitat value could be used to offset the loss in habitat value which would result from implementation of the proposed hurricane protection levee.

The Habitat Evaluation Procedures analysis performed on the proposed mitigation area indicated that the construction, operation, and maintenance of a comprehensive water management program comprising a system of levees and water control structures would provide an average annual excess of 8[illegible] HU's. That excess would adequately compensate for the project-induced

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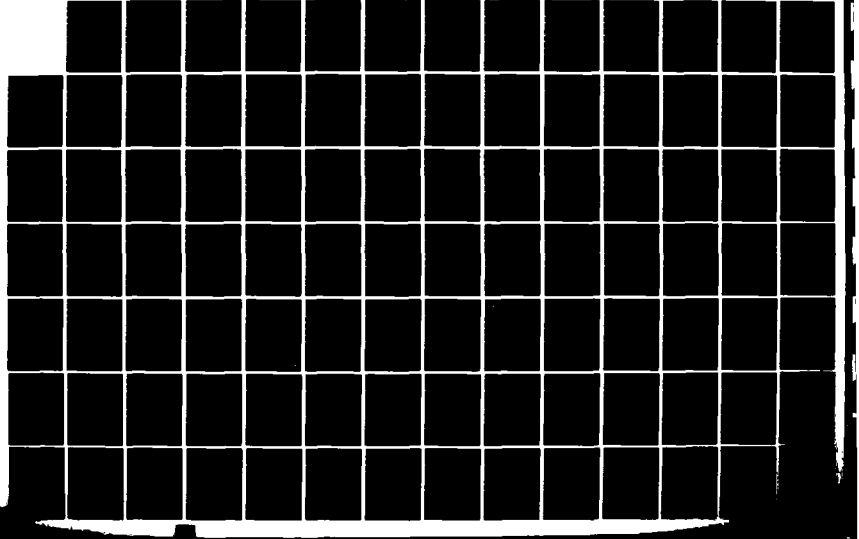
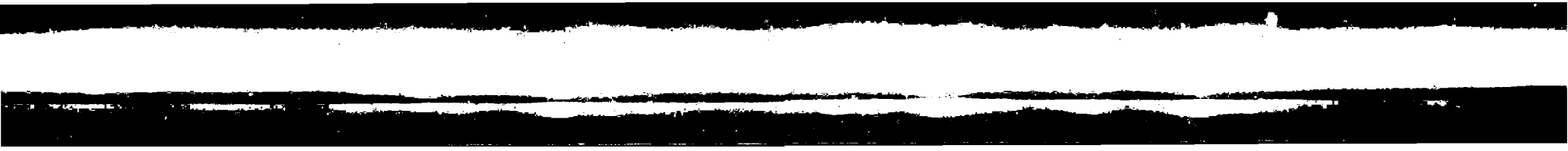
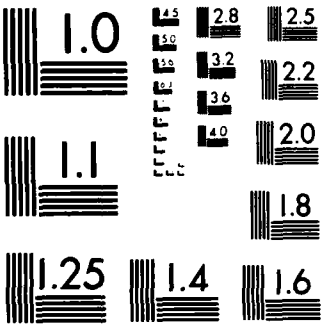






annual loss of 82,931 HU's. However, analysis of the impact of the management program on human-use values (i.e., man-day/monetary analysis) indicated that the program would vary in its ability to compensate for the project-induced losses of those values. Approximately 400,000 pounds of the over 500,000-pound annual loss of commercial fishery harvest and only 2,400 of the nearly 3,300 man-days of sport fishing lost annually as a result of the project would be replaced via the mitigation plan. Even after implementation of the proposed management plan, then, a significant deficit in Coastal Louisiana's sport fishing potential and commercial fishery harvest would exist due to implementation of the hurricane protection project. Conversely, sport hunting potential and its attendant monetary value, produced via the mitigation plan, would almost double sport hunting potentials which would be lost with project implementation. Nearly four times the loss in fur harvest value associated with the hurricane protection project would be replaced by the mitigation plan, while increased wildlife-oriented recreation values produced under the mitigation plan would be slightly below that required to fully compensate for those values lost through project construction.

It has been concluded, then, that the proposed mitigation plan, if implemented simultaneously with renewed project construction, would in most respects adequately compensate for project-induced losses to fish and wildlife resources. It has been further concluded that much of the Pointe-au-Chien Wildlife Management Area outside of the proposed mitigation area (approximately 23,000 acres) will continue to deteriorate and be lost to subsidence and erosion at an ever increasing rate. Inasmuch as this continued marsh loss is a primary result of eliminating freshwater and sediment transport due to levee construction along the Lower Mississippi River and, in particular, elimination of Bayou Lafourche as a distributary of the Mississippi River, it would seem appropriate to support, via project funding, enhancement of that portion of the Wildlife Management Area not proposed for inclusion under the mitigation proposal. Such enhancement is provided for via the Federal Water Project Recreation Act, Public Law 89-72, as amended (16 U.S.C. 460-1 (12), et seq.). In this case, the Act would provide that initial implementation costs of the enhancement program for sport fish and wildlife resources be cost-shared on a 75 percent Federal and 25 percent non-Federal basis. In addition, non-Federal interests would assume all costs for operation, maintenance, and replacement of structural enhancement features. We plan to include details regarding this enhancement proposal in our final Fish and Wildlife Coordination Act report on this project.

PROJECT DESCRIPTION

The Larose to Golden Meadow, Louisiana, Hurricane Protection project (formerly Grand Isle, Louisiana, and Vicinity Hurricane Protection project) was authorized by Public Law 89-298, 89th Congress, on October 27, 1965. The authorized project, described in the General Design Memorandum (GDM) completed in May 1972 and in the Final Environmental Impact Statement (EIS) completed in November 1973, involved the enlargement of existing non-Federal levees and/or the construction of new levees along the alignment indicated in Figure 1. The project area, to be enclosed by approximately 41 miles of perimeter levees, would extend along both banks of Bayou Lafourche from Larose, Louisiana, to approximately 2 miles south of Golden Meadow, Louisiana. The existing non-Federal levees would be enlarged by placing material along the new levee centerline in a series of lifts which would either straddle the existing levees or be located adjacent to them. In areas where levees were not present, material would be placed along the new levee centerline in a series of lifts. Throughout most of the project reach, the borrow areas would be located on the protected side of the levee; however, two sections would utilize borrow areas located outside the new levee. Navigation access into the protected area would be provided via two floodgates to be constructed across Bayou Lafourche, one at the north end and one at the south end of the protected area. Although the project would provide for gravity drainage of runoff from the protected area, local interests have indicated their intent to develop a pumping system for drainage of the enclosed area. Cosntruction of certain segments of the authorized levee alignment began in 1975.

In a July 3, 1975, letter report (Appendix A), the Fish and Wildlife Service (FWS) noted that approximately 3,550 acres of valuable fish and wildlife wetland habitat would be lost via implementation of the authorized project and recommended the following project modifications to reduce anticipated fish and wildlife losses:

1. relocate the levee south of Yankee Canal and east of Bayou Lafourche to the natural levee along Bayou Lafourche or immediately adjacent to it, to exclude some 2,700 acres of brackish marsh;

2. relocate the levee near Belle Amie to exclude some 750 acres of fresh marsh and 100 acres of wooded swamp;

3. stockpile dredged material from construction of the floodgate south of Golden Meadow within the protected area, rather than within wetlands outside the protected area; and

4. obtain borrow material from within the protected area for all levee construction.

In an October 3, 1975, letter responding to FWS recommendations, the New Orleans District Corps of Engineers (NODCE) indicated its willingness to partially accommodate the request to relocate the levee south of Yankee Canal and east of Bayou Lafourche (Figure 2), thereby reducing wetland

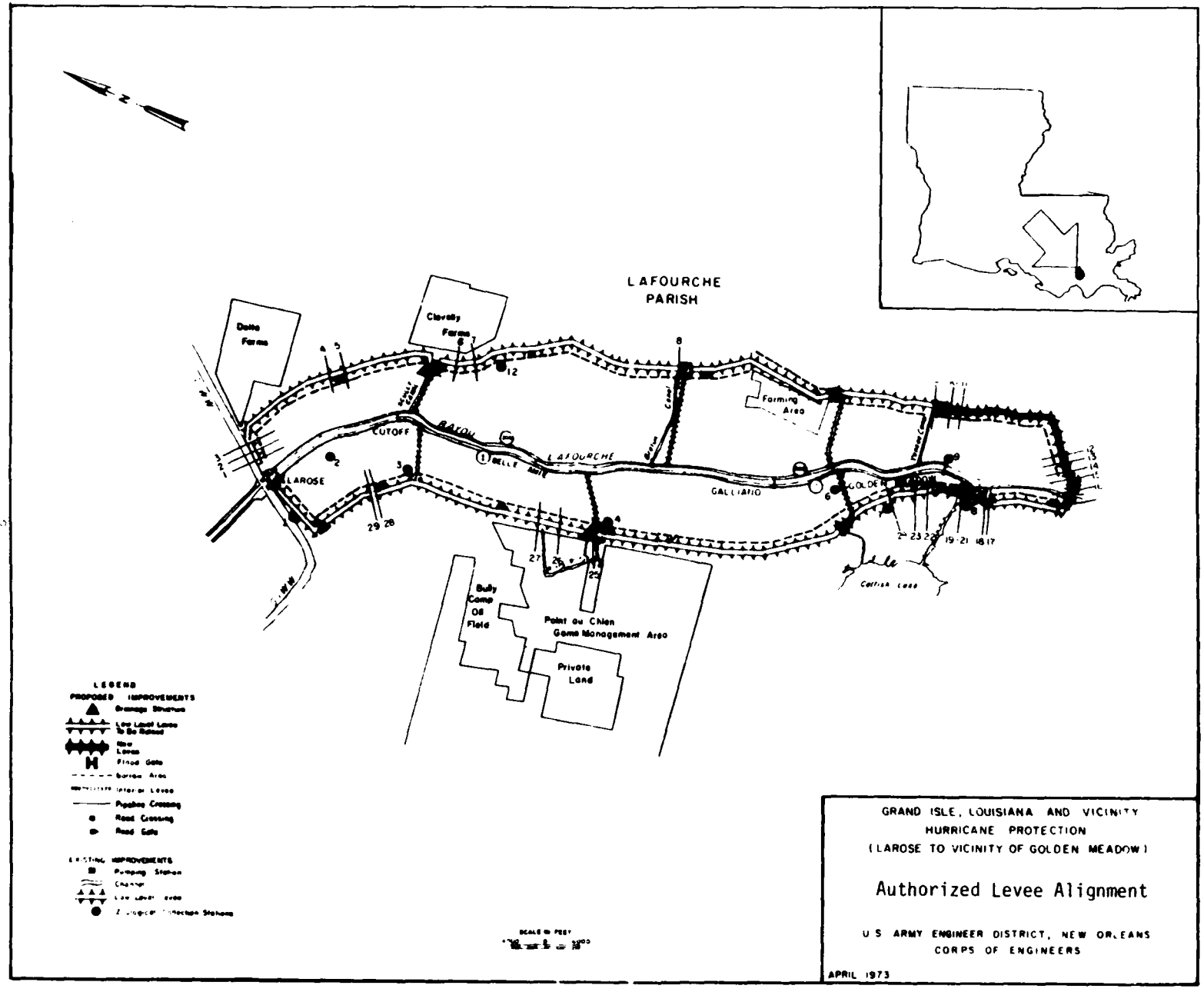

LAFOURCHE
PARISH
Delta Farms
Clovelly Farms
CUTOFF
BAYOU
LAFOURCHE
LAROSE
GALLIANO
Farming Area
Bully Camp Oil Field
Point au Chien Game Management Area
Private Land
LEGEND
PROPOSED IMPROVEMENTS
EXISTING IMPROVEMENTS
GRAND ISLE, LOUISIANA AND VICINITY
HURRICANE PROTECTION
(LAROSE TO VICINITY OF GOLDEN MEADOW)
Authorized Levee Alignment
U S ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
APRIL 1973

Figure 1

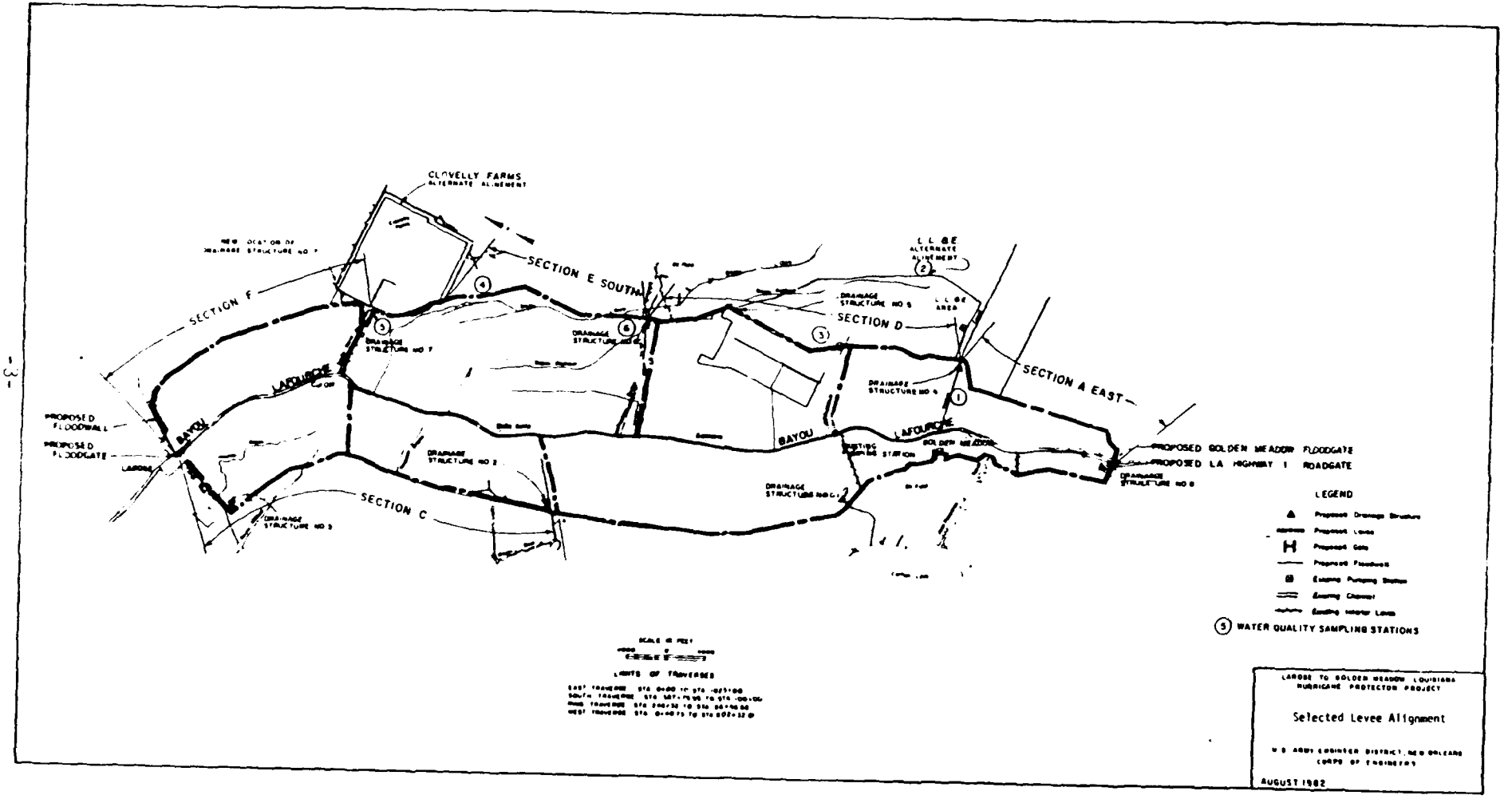

CLOVELLY FARMS
ALTERNATE ALIGNMENT
SECTION E SOUTH
SECTION F
SECTION D
SECTION A EAST
SECTION C
L L & E
ALTERNATE
ALIGNMENT
L L & E
AREA
DRAINAGE STRUCTURE NO 1
DRAINAGE STRUCTURE NO 2
DRAINAGE STRUCTURE NO 3
DRAINAGE STRUCTURE NO 5
DRAINAGE STRUCTURE NO 6
DRAINAGE STRUCTURE NO 7
DRAINAGE STRUCTURE NO 8
PROPOSED
FLOODWALL
PROPOSED
FLOODGATE
LAROSE
BAYOU
LAFOURCHE
BAYOU
PROPOSED GOLDEN MEADOW FLOODGATE
PROPOSED LA HIGHWAY 1 ROADGATE
LIMITS OF TRAVERSES
LEGEND
Proposed Drainage Structure
Proposed Levee
Proposed Gate
Proposed Floodwall
Existing Pumping Station
Existing Channel
Existing Interior Levee
5 WATER QUALITY SAMPLING STATIONS
LAROSE TO GOLDEN MEADOW, LOUISIANA
HURRICANE PROTECTION PROJECT
Selected Levee Alignment
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
AUGUST 1982

FIGURE 2

losses by approximately 800 acres. Further, NODCE agreed to stockpile dredged material from construction of the floodgate south of Golden Meadow within the protected area and to remove borrow material from within the protected area for all levee construction. NODCE noted, however, that relocation of the levee near Belle Amie was not considered feasible due to greatly increased construction and maintenance costs and difficulties and delays associated with obtaining rights-of-way. In its January 9, 1976, letter discussing the project changes agreed to by NODCE (Appendix B), the FWS noted that some 2,750 acres of wetlands would still be eliminated by completion of the project as planned and generally addressed available options for mitigating that loss.

By letter dated April 28, 1980, NODCE requested FWS comments on a proposal to include within the levee system two additional areas, Clovelly Farms and lands owned by the Louisiana Land and Exploration Company (LL&E), both adjacent to the east levee alignment (Figure 2). In its August 7, 1980, letter of comment (Appendix C) on the proposal to amend the alignment, the FWS noted an increase in wetland loss of approximately 300 acres due to inclusion of the two new areas into the levee system. Of even greater significance was the FWS finding that, in addition to the original estimate of 2,750 acres of wetlands, 1,195 acres of fresh to intermediate marsh and 590 acres of forested wetlands would be destroyed with the authorized alignment.

In March 1982, the NODCE completed Supplement No. 1 to the GDM and included in the recommended plan the originally authorized levee alignment with the aforementioned modification in the levee south of Yankee Canal and east of Bayou Lafourche and with the addition of the Clovelly Farms and LL&E areas (Figure 2). According to the reanalyses of project-induced damages to fish and wildlife resources presented in planning aid reports dated March 26, 1982 (Appendix D) and June 30, 1982 (Appendix E), the FWS estimated that implementation of this plan would result in the loss of a total of 4,348 acres of wetland habitat.

Although significant modifications in the plans for this project have occurred since the project was authorized in 1965, the NODCE Project Engineer indicated, via telecon on October 21, 1982, that future deviations in the selected plan were not likely. On February 7, 1983, the NODCE Project Biologist furnished, via telecon, updated fish and wildlife habitat acreages (totalling 4,598 acres) that would be included within the project area. This report and the analyses, conclusions, and recommendations contained therein are based on that selected plan and those updated acreage figures.

AREA SETTING

General

The project area is located on a delta formed by Bayou Laforuche, a distributary of the Mississippi River between 1,800 and 1,000 years ago, and is within Hydrologic Unit IV according to Chabreck (1972). Principal physiographic features include the natural levee ridge adjacent to Bayou Lafourche and forested wetlands and marshlands which occupy areas of lower elevation adjacent to the ridge. The area is situated near the central

portion of the axis of the Gulf Coast Geosyncline where downwarping and subsidence have been occurring concurrently since the end of the Tertiary period. The present rate of subsidence in this area is estimated to be slightly less than 1 foot per century (U.S. Army Corps of Engineers 1973).

Bayou Lafourche, formerly a distributary of the Mississippi River, was permanently separated from the Mississippi River by a closure at Donaldsonville, Louisiana, in 1904. The major source of inflow into the bayou is now rainfall runoff from about 300 square miles of adjoining land. There is also a pumping station at Donaldsonville that diverts water from the Mississippi River into the bayou at an average rate of 260 cubic feet per second.

Local interests have constructed low levees generally along the same alignment as that of the selected hurricane protection alignment. Those levees were constructed for the development of agricultural lands, however, and do not provide hurricane protection.

Description of Habitats

Major fish and wildlife habitat types identified in the project area include fresh/intermediate marsh, brackish/saline marsh, open water, and forested wetlands. According to the classification of Cowardin et. al. (1979), fresh marsh is defined as palustrine emergent wetland; intermediate, brackish, and saline marsh are termed estuarine emergent wetlands; and shallow open waters are termed palustrine open waters where salinity is less than 0.5 parts per thousand (ppt) and estuarine open water where salinities average more than 0.5 ppt. Under that same classification system forested wetlands are broadly categorized as palustrine forested wetlands. Detailed descriptions of these habitat types were included in FWS letter reports dated July 3, 1975; January 9, 1976; August 7, 1980; March 26, 1982; and June 30, 1982 (Appendices A, B, C, D, and E, respectively).

As previously mentioned, the natural levee ridge along Bayou Lafourche and the adjacent forested wetlands and marshes are a product of the deposition of sediments carried from the Mississippi River into Bayou Lafourche and deposited in shallow open waters. Levee construction along the Lower Mississippi River and, in particular, elimination of Bayou Lafourche as a distributary of the Mississippi River (reference "General" discussion) has virtually eliminated freshwater and sediment transport to the project area wetlands. Reduced freshwater inflow and extensive canal dredging has allowed saltwater intrusion, the net result of which has been accelerated subsidence and erosion of marshes and swamps and a conversion to more saline vegetation types. Additional fish and wildlife habitat loss has also occurred due to drainage projects and associated development for residential, commercial, and agricultural expansion. If these causes of habitat loss continue, the fish and wildlife habitat available in the future without-project condition will be considerably reduced. For analysis purposes, it has been assumed that those habitat losses will continue into the future. Based on the procedure identified in Appendix D, habitat acreages were estimated for the future without-project condition at

various target years (Table 1). Since project implementation began in the year 1975, that time was designated as the base year or existing condition. Other target years were selected based on their relative significance over the life of the proposed project (i.e., 1986 - the end of the first levee lift, 1991 - all of the enclosed area under pumped drainage, 1996 - completion of all 3 project lifts, 2026 - 30 years after completion of the project, and 2096 - end of project life).

Fishery Resources

The wetlands of the project area, which include fresh to saline marsh and forested areas, provide suitable habitat for numerous juvenile and adult freshwater and estuarine-dependent fishes and shellfishes as discussed in detail in Appendices A, B, and C. The major contribution of these wetlands to fishery resources is in the form of organic detritus which is transported into adjacent estuarine waters where it forms the basis of a detritus-based food web. The contribution of vascular plant detritus to estuarine fisheries productivity is documented by Darnell (1961) and Odum et al. (1973). Recent studies by Daud (1979), Rogers (1979), Simoneaux (1979), and Chambers (1980) have substantiated the value of shallow marsh areas as nursery habitat for numerous estuarine-dependent species within the upper Barataria Basin (Hydrologic Unit IV).

There is growing evidence that the acreage of vegetated wetlands in Louisiana is the most important factor influencing the production of estuarine-dependent fishes and shellfishes of sport and commercial importance. Turner (1979) reported that Louisiana's commercial shrimp harvest is directly proportional to the area of intertidal wetlands. Harris (1973) stated that Louisiana has reached the maximum sustainable yield in shrimp production and that any decline in wetlands will result in a corresponding reduction in that production. Based on these considerations, it was assumed that the magnitude of future declines in marsh acreages within the project area would result in a proportionate decline in future sport and commercial estuarine-dependent finfish and shellfish harvest within Hydrologic Units IV and V (Table 2). The figures in Table 2 indicate a 50 percent reduction in average annual man-days of sport fishing and commercial harvest resulting from marsh loss in the project area over the next 120 years.

Wildlife Resources

The area of direct project impact supports a variety of wildlife species. A comprehensive listing of those species is contained in planning aid reports in Appendices A and C. Estimates of population levels of certain recreationally important species in the project area for the future without-project condition is contained in Table 3. Just as with production and harvest of estuarine-dependent finfish and shellfish (Table 2), populations of recreationally important wildlife species (Table 3) are expected to decline proportionally to losses in wetland habitats. Certain species or species groups will support a level of sport hunting consistent with sustained annual harvest rates and hunter success rates for the various habitat types in the project area. A measure of sport hunting

Table 1. Habitat acreage changes in the project area projected for the future without-project condition at various target years

Target year	Fresh/ Intermediate Marsh	Brackish/ Saline Marsh	Open Water	Forested Wetlands	Pasture	Developed	Total[1]
1975 (base year)	1093	845	1638	1022	0	0	4598
1986	763	906	1907	866	131	25	4598
1991	648	911	2017	803	184	35	4598
1996	550	907	2119	745	233	45	4599
2026	206	763	2607	475	460	88	4599
2096	21	353	3202	166	720	137	4599
Annualized	298	685	2594	489	448	86	4599

1. Totals vary slightly due to rounding errors.

Table 2. Changes in sport fishing use and value and commercial harvest and value of major estuarine-dependent finfishes and shellfishes in the future without-project condition at various target years

Target year	Total Marsh[1] (acres)	Sport Fishing[2] Use (man-days)	Sport Fishing[3] Value (thousands of dollars)	Commercial[4] Harvest (millions of pounds)	Commercial[5] Harvest Value (thousands of dollars)
1975 (base year)	1,938	7,752	30.2	1.26	315
1986	1,669	6,676	26.0	1.09	273
1991	1,559	6,236	24.3	[illegible]	253
1996	1,457	5,828	22.7	0.95	238
2026	969	3,876	15.1	0.63	158
2096	374	1,496	5.8	0.24	60
Annualized	983	3,929	15.3	0.64	160

1. Sum of all marsh types in Table 1.

2. Value is the product of the estimated 4 man-day per acre usage figure (average for Hydrologic Units IV and V) from U.S. Army Corps of Engineers (1977) and the total marsh acreage.

3. Value is the product of man-days of sport fishing use and $3.90 (value for low intensity consumptive use of fish and wildlife resources).

4. Adjusted Hydrologic Unit IV harvest data (302,950,000 pounds) from Table 4 of Draft Fish and Wildlife Coordination Act Report on the Louisiana Coastal Area Study (March 1982) divided by the total acres of marsh habitat (465,797 acres) in Hydrologic Unit IV yielded an average commercial harvest value of 650.39 pounds of commercial harvest per acre of marsh. That value was multiplied by the total marsh acreage to determine commercial harvest in each target year.

5. Value ($75,130,000) for commercial harvest from Hydrologic Unit IV divided by adjusted harvest data (302,950,000 pounds) for Hydrologic Unit IV (both figures from Table 4 of Draft Fish and Wildlife Coordination Act Report cited above) yielded an average commercial harvest value of $0.25 per pound. That value was multiplied by the pounds of commercial harvest to determine dollar value in each target year.

Table 3. Changes in total numbers of animals of selected species in the project area in the future without-project condition at various target years

Wildlife Resources	1975	1986	1991	1996	2026	2096	Annualized
Fresh/Intermediate Marsh							
Deer[1]	31	22	19	16	6	1	9
Rabbit[2]	547	382	324	275	103	11	149
Squirrel	N/A[5]	N/A	N/A	N/A	N/A	N/A	N/A
Mottled Duck[3]	16	11	10	8	3	0	4
Brackish/Saline Marsh							
Deer	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Rabbit	338	362	364	363	305	141	274
Squirrel	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mottled Duck	4	4	4	4	4	2	3
Forested Wetlands							
Deer	17	14	13	12	8	3	8
Rabbit	511	433	402	373	238	83	245
Squirrel[4]	511	433	402	373	238	83	245
Mottled Duck	N/A	N/A	N/A	N/A	N/A	N/A	N/A

1. Methodology for computing numbers of deer is discussed in Planning Aid Letter dated February 24, 1982 (Appendix F).

2. Methodology for computing numbers of rabbits is discussed in Planning Aid Letter dated February 24, 1982 (Appendix F).

3. Methodology for computing number of mottled ducks per acre after Hugh Bateman (personal communication), Louisiana Department of Wildlife and Fisheries.

4. Methodology for computing numbers of squirrels is discussed in Planning Aid Letter dated February 24, 1982 (Appendix F).

5. Not applicable.

potentials and related monetary values within the project area is presented in Table 4. Similarly, a measure of fur catch and related monetary values from various habitats in the project area is presented in Table 5.

A summary of the per-acre monetary value of the project area wetlands is available in Table 6. Those data indicate that marsh is, by far, the most valuable habitat when considering sport and commercial fish and wildlife production.

Endangered Species

Via letter dated July 1, 1981, to the NODCE (Appendix G), the FWS confirmed that there were no endangered or threatened species, nor species proposed for such listing, likely to reside in the project area and that there was no designated critical habitat in the vicinity of the project area.

Wildlife Management Areas

The Louisiana Department of Wildlife and Fisheries operates two wildlife management areas in the vicinity of the project area. The Pointe-au-Chien Wildlife Management Area lies just west of the project area and about halfway between the towns of Larose and Golden Meadow. That Management Area consists of approximately 28,000 acres of intermediate to brackish marsh and, like much of the remaining marshland of coastal Louisiana, is suffering from subsidence, salinity intrusion, and a lack of freshwater and nutrient inflow. The Wisner Wildlife Management Area is a 26,000-acre saline marsh area located southeast of Golden Meadow. As a result of its higher salinities, that area is less productive than Pointe-au-Chien as a sport hunting area.

PROJECT IMPACT ASSESSMENT METHODOLOGY

For this project the FWS employed two basic analytical methods to qualify and quantify project impacts. One method, the Habitat Evaluation Procedures (HEP) analysis, involved qualification and quantification of the non-monetary impacts of the proposed action to terrestrial (wildlife) species. The second method, the man-day/monetary analysis, quantified impacts to commercial fishery and fur harvests and to sport fishing and hunting and wildlife-oriented recreation.

Using the FWS's HEP analysis, habitat quality and quantity were established for baseline conditions and predicted for future with- and future without-project conditions. This standardized methodology allowed a numeric comparison of future with- and future without-project conditions at various times (target years) during the life of a project and, hence, provided a measure of project-induced impacts to fish and wildlife resources. In implementing the HEP, a representative list of species or species groups (including species of primary economic concern or high public interest and visability) was selected for the project area. Various sample sites within each habitat type occurring in the project area

Table 4. Sport hunting potential and value of project area

Wildlife Resources	Potential effort[1] (man-days/acre)	Value per man-day[2] (dollars)	Value per acre (dollars)
Fresh/Intermediate Marsh			
Deer	0.250	13.80	3.45
Rabbit	0.176	3.90	0.69
Squirrel	N/A[3]	N/A	N/A
Waterfowl	0.488	13.80	6.73
Marsh birds	0.254	3.90	0.99
TOTAL	1.168	-	11.86
Brackish/Saline Marsh			
Deer	Negligible	N/A	N/A
Rabbit	0.141	3.90	0.55
Squirrel	N/A	N/A	N/A
Waterfowl	0.383	13.80	5.29
Marsh birds	0.261	3.90	1.02
TOTAL	0.785	-	6.86
Forested Wetlands			
Deer	0.130	13.80	1.79
Rabbit	0.176	3.90	0.69
Squirrrel	0.161	3.90	0.63
Waterfowl	0.035	13.80	0.48
Marsh birds	N/A	N/A	N/A
TOTAL	0.502	-	3.59

1. Methodology for computing man-day per acre values is discussed in Planning Aid Letter dated February 24, 1982 (Appendix F).

2. Values provided by Ted Hokkanen (personal communication), U.S. Army Corps of Engineers, New Orleans District.

3. Not Applicable.

Table 5. Estimated fur catch and value of project area

Wildlife Resources	Catch per acre[1] (average no. of pelts)	Value per pelt[3] (dollars)	Value per acre (dollars)
Fresh/Intermediate Marsh			
Marsh	0.0880	5.43	0.48
Nutria	0.3988	7.39	2.95
Mink	0.0015	13.67	0.02
Otter	0.0005	44.55	0.07
Raccoon	0.0093[4]	11.46	0.11
Alligator	0.0080[4]	204.40	1.64
TOTAL	-	-	5.27
Brackish/Saline Marsh			
Muskrat	0.0527[2]	5.43	0.29
Nutria	0.0540[2]	7.39	0.40
Mink	0.0007[2]	13.67	0.01
Otter	0.0001[2]	44.55	Negligible
Raccoon	0.0049[4]	11.46	0.06
Alligator	0.0031[4]	204.40	0.63
TOTAL	-	-	1.39
Forested Wetlands			
Muskrat	0.0140[5]	5.43	0.08
Nutria	0.0620[5]	7.39	0.46
Mink	0.0160[5]	13.67	0.22
Otter	Negligible[5]	N/A	Negligible
Raccoon	0.0480[5]	11.46	0.55
Alligator	Negligible	N/A	Negligible
TOTAL	-	-	1.31

1. Unless otherwise noted, average catch per acre is adapted from Palmisano (1973).
2. Value is average of brackish marsh value from Pasmisano (1973) plus 25 percent of

Table 6. Summary of sport/commercial fish and wildlife value of wetland habitats of project area

Fish and Wildlife Use	Fresh/Intermediate Marsh (dollars)	Brackish/Saline Marsh (dollars)	Forested Wetlands (dollars)
Commercial fishery harvest[1]	162.77	162.77	N/A[6]
Sport fishing[2]	15.56	15.56	N/A
Sport hunting[3]	11.86	6.86	3.59
Commercial fur harvest[4]	5.27	1.39	1.31
Wildlife-Oriented recreation[5]	1.40	1.40	1.65
TOTAL	196.85	187.97	6.55

1. This figure represents the annualized value per acre attributable to commercial fishery harvest, from Table 2.

2. This figure represents the annualized value per acre attributable to sport fishing, from Table 2.

3. Sum of value of all forms of sport hunting expected to occur in project area, from Table 4.

4. Sum of value of furbearer harvest, from Table 5.

5. Value is the product of the estimated man-day usage (average for Hydrologic Units IV and V) from U.S. Army Corps of Engineers (1977) and $3.90 (the value of a man-day of general recreation as per Hokkanen, New Orleans District Corps of Engineers, personal communication).

6. Not applicable.

were rated, on a scale of 0 to 10, according to their ability to support the selected species or species groups. Within the scale of 0 to 10, habitat rating a 0 was considered the poorest and habitat rating 10 was considered the best. The average of those scores for all species over all sample sites within one habitat type yielded a relative measure of the value of that habitat type, termed a habitat unit value (HUV). When the HUV was multiplied by the acreage of a particular habitat type available, the result was a measure of both habitat quality and quantity, expressed as habitat units (HU). Comparison of the available HU's in the future without- and future with-project conditions afforded a measure of the anticipated impacts of the project.

A man-day/monetary analysis was performed to measure tangible impacts upon human uses of fish, wildlife, and related recreational resources of the project area. In this analysis, the estimate of human use was based on past harvest records, for commercial fishery and fur production, and on the potential of the resource to support that use, for sport fishing and hunting and wildlife-oriented recreation. An appropriate monetary value was applied to human uses of those resources, as previously indicated in Tables 2, 4, and 5. Subsequently, per-acre sport/commercial fish and wildlife monetary values for various wetland habitat types within the project area were computed (Table 6). Those values were applied to estimated future without- and future with-project habitat supply. The difference (either positive or negative) between these two conditions afforded a measure of fish and wildlife monetary impacts from the project.

Of the two methods (described above) of identifying impacts, it is the policy of the FWS to use the HEP analysis as the basic analytical tool for evaluating impacts and formulating recommendations. The policy is not meant to exclude man-days as a valid measure of project impact. On the contrary, recreational use is important and highly pertinent. Efforts to fulfill the conservation purposes of the Fish and Wildlife Coordination Act, however, must be founded on protecting and maintaining the biological productivity and integrity of the resource base. Only in this manner can we protect and conserve the myriad values that fish and wildlife provide to the Nation. Any measure not founded on the biological basis of resource protection will, in the long run, serve neither the resource nor the human use of that resource.

PROJECT IMPACTS

General

As previously discussed in the Project Description section of this report, substantial modifications in original project plans have been instituted which would reduce damages to fish and wildlife resources. However, under the presently selected plan these damages would still be quite severe.

The selected plan would have both direct and indirect adverse impacts on fish and wildlife resources. Direct impacts are primarily associated with levee construction and associated borrow material excavation in wetlands. The most serious indirect impacts involve inclusion of additional wetland

areas in the hurricane levee system and subsequent elimination of these habitats by forced drainage.

Within five years of the start of construction, the levee system would have eliminated, via direct and indirect causes, 648 acres of fresh/intermediate marsh, 911 acres of brackish/saline marsh, 1,357 acres of open water habitat, and 261 acres of forested wetlands. However, as noted in the Description of Habitats section of this report, wetland habitats are already being converted, primarily to open water, via "natural forces" at a very rapid rate. Under future without-project conditions, a loss of 627 acres of fresh/intermediate marsh, 558 acres of brackish/saline marsh, and 637 acres of forested wetlands is anticipated. The project would, nevertheless, greatly accelerate the rate of loss of these wetland habitats, causing a net annual loss of 215, 607, and 227 acres of fresh/intermediate marsh, brackish/saline marsh, and forested areas, respectively.

Conversely, levee and pasture habitat acreages would be significantly increased (758 and 1,759 acres, respectively, on an annualized basis). Their value to important fish and wildlife resources is, however, miniscule when compared to the value of marshes and forested wetlands which they would displace.

Habitat Evaluation Procedures Analysis

A detailed discussion of the HEP analysis completed for the selected plan is available in planning aid letters dated March 26 and June 30, 1982 (Appendices D and E). That analysis of future without- and future with-project habitat conditions showed a net annualized loss of 2,853 acres of marsh, open water, and forested wetlands and a net annualized gain of 2,517 acres of levee and pasture (Table 7). When the HUV's (Table 8), assigned by a team of biologists representing the NODCE, FWS, and Louisiana Department of Wildlife and Fisheries (LDWF), were multiplied by the various habitat acreages (Table 7), the result was a measure of the number of HU's available by habitat type in the future with- and future without-project conditions (Table 9). In the analysis, it was assumed that baseline (existing) HUV's for all habitat types would remain constant in the future without-project condition. Similarly, future with-project HUV's for marsh habitats, levee, and pasture were assumed to be the same as future without-project HUV's. Developed areas were considered to have no wildlife resource value. All of the future with-project open water areas would be in the form of borrow pits, half of which would be enclosed by the levee and half of which would be contiguous with marshes outside the leveed area. It was assumed that the HUV of open water areas outside the leveed area would remain constant; whereas, the HUV of open water areas within the leveed area would be reduced by 50 percent. Accordingly, an average HUV of 18.75, i.e., (25.00 +12.50) ÷ 2, was applied to open water in the future with project condition. The HUV of forested wetlands remaining in the

Table 7. Comparison of future without-project (FWOP) and future with-project (FWP) habitat acreages

Target year	Fresh/ Intermediate Marsh	Brackish/ Saline Marsh	Open Water	Forested	Levee	Pasture	Developed	Total[1]
1975 FWOP	1093	845	1638	1022	0	0	0	4598
FWP	1093	845	1638	1022	0	0	0	4598
1986 FWOP	763	906	1907	866	0	131	25	4598
FWP	504	596	1961	630	794	95	18	4598
1991 FWOP	648	911	2017	803	0	184	35	4598
FWP	0	0	660	542	794	2186	416	4598
1996 FWOP	550	907	2119	745	0	233	45	4599
FWP	0	0	660	466	794	2250	428	4598
2026 FWOP	206	763	2607	475	0	460	88	4599
FWP	0	0	660	188	794	2484	472	4598
2096 FWOP	21	353	3202	166	0	720	137	4599
FWP	0	0	660	23	794	2623	498	4598
Annualized FWOP	298	685	2594	489	0	448	86	4599
FWP	83	78	790	262	758	2207	419	4598
Net Change	-215	-607	-1804	-227	+758	+1759	+333	-1

1. Totals vary slightly due to rounding errors.

Table 8. Habitat unit values of project area for baseline (existing), future without-project (FWOP), and future with-project (FWP) conditions

Habitat type	Baseline	FWOP	FWP
Fresh/Intermediate Marsh	60.25	60.25	60.25
Brackish/Saline Marsh	48.00	48.00	48.00
Open Water	25.00	25.00	18.75
Forested Wetlands	32.10	32.10	10.70
Levee/Pasture	7.50	7.50	7.50
Developed areas	0	0	0

Table 9. Comparison of future without-project (FWOP) and future with-project (FWP) habitat units

Target year		Habitat Units by Habitat type					
		Fresh/ Intermediate Marsh	Brackish/ Saline Marsh	Open Water	Forested	Levee	Pasture
1975	FWOP	65,853	40,560	40,950	32,806	0	0
	FWP	65,853	40,560	40,950	32,806	0	0
1986	FWOP	45,971	43,488	47,675	27,799	0	983
	FWP	30,366	28,608	49,025	20,223	5,955	713
1991	FWOP	39,042	43,728	50,425	25,776	0	1,380
	FWP	0	0	12,375	5,799	5,955	16,395
1996	FWOP	33,138	43,536	52,975	23,915	0	1,748
	FWP	0	0	12,375	4,986	5,955	16,875
2026	FWOP	12,412	36,624	65,175	15,248	0	3,450
	FWP	0	0	12,375	2,012	5,955	18,630
2096	FWOP	1,265	16,944	80,050	5,329	0	5,400
	FWP	0	0	12,375	246	5,955	19,673
Annualized	FWOP	17,934	32,857	64,846	15,695	0	3,362
	FWP	5,001	3,735	16,097	4,692	5,684	16,554
Net Change		-12,933	-29,122	-48,749	-11,003	+5,684	+13,192

future with-project condition is expected to decline to one-third of the future without-project HUV due to increased grazing by domestic livestock, drainage, and destruction of adjacent marshes.

As indicated in Table 9, there would be a net annualized loss of 82,931 HU's in the future with-project condition, when compared to the future without-project condition. The extremely high loss of HU's associated with the project is a result of the direct and indirect destruction of wetlands, and the significant reduction in the wildlife value of the forested wetlands and open water habitat remaining within the levee system.

Man-Day/Monetary Analysis

As indicated in the Fishery Resources section of this report, it was assumed, based on recent published reports, that any decline in marsh acreages within the project area would result in a proportionate decline in sport fishing and commercial estuarine-dependent finfish and shellfish harvest. Figures in Table 2 indicate a 50 percent reduction in average annual sport fishing and commercial harvest in the future without-project condition. Applying the same analysis procedures to the future with-project marsh habitat conditions and comparing annualized sport fishing and commercial harvest figures to future without-project figures indicated that the project would cause an annualized loss of 3,286 man-days of sport fishing, valued at nearly $13,000, and a 540,000-pound net average annual reduction in commercial harvest of estuarine-dependent finfishes and shellfishes, valued at over $133,000 (Table 10).

In estimating project impacts to sport hunting potential, commercial fur harvest, and wildlife-oriented recreation, it was assumed, as with sport fishing and commercial fishery harvest, that project-induced changes in habitat acreages would result in directly proportionate changes in man-days of use and monetary value. The data presented in Table 11 indicate that implementation of the selected plan would result in the net annual loss of 930 man-days of sport hunting, valued at over $8,000. In addition, the project would cause the annual loss of over $4,320 in fur harvest and wildlife-oriented recreation.

Endangered Species

In a June 9, 1981, letter (Appendix E) to the FWS, the Chief of the NODCE's Planning Division requested a list of endangered and/or threatened species, and species proposed for such listing, which might occur in the project area. In a July 1, 1981, letter response (Appendix E) the FWS indicated that no endangered or threatened species, nor species proposed for such listing, were likely to reside in the project area. Accordingly, no further endangered species coordination would be required for the project, as proposed. No significant project changes, which might alter that opinion, have occurred since that time.

Table 10. Comparison of future without-project (FWOP) and future with-project (FWP) sport fishing use and value and commercial harvest and value of major estuarine-dependent finfishes and shellfishes

Target year		Total marsh[1] (Acres)	Sport[2] Fishing Use (man-days)	Sport[3] Fishing Value (dollars)	Commercial[4] Harvest (millions of pounds)	Commercial[5] Harvest Value (dollars)
1975	FWOP	1,938	7,752	30,233	1.26	315,000
	FWP	1,938	7,752	30,233	1.26	315,000
1986	FWOP	1,669	6,676	26,036	1.09	272,500
	FWP	1,100	4,400	17,160	0.72	180,000
1991	FWOP	1,559	6,236	24,320	1.01	252,500
	FWP	0	0	0	0	0
1996	FWOP	1,457	5,828	22,729	0.95	237,500
	FWP	0	0	0	0	0
2026	FWOP	969	3,876	15,116	0.63	157,500
	FWP	0	0	0	0	0
2096	FWOP	374	1,496	5,834	0.24	60,000
	FWP	0	0	0	0	0
Annualized	FWOP	982	3,929	15,322	0.64	159,500
	FWP	161	643	2,509	0.10	26,200
Net Change		-821	-3,286	-12,813	-0.54	-133,300

1. Sum of all marsh types in Table 7.

2. Product of 4 man-days per acre usage figure (from Table 2) and total marsh acreage available.

3. Product of $3.90 (from Table 2) and man-days of sport fishing use.

4. Product of 650.39 pounds of commercial harvest per acre of marsh (generated in Table 2) and total marsh acreage available.

5. Product of $0.25 per pound (generated in Table 2) and pounds of commercial harvest.

Table 11. Comparison of man-day/monetary values for future without-project (FWOP) and future with-project (FWP) habitat conditions for selected wildlife related parameters

Habitat types	Acres[1]	Sport hunting potential[2] (man-days)	Sport hunting value[3] (dollars)	Fur catch value[4] (dollars)	Wildlife-oriented recreation value[5] (dollars)
Fresh/Intermediate Marsh					
FWOP(Annualized)	298	348	3,534	1,570	417
FWP(Annualized)	83	97	984	437	116
Net change	-215	-251	-2,550	-1,133	-301
Brackish/Saline Marsh					
FWOP(Annualized)	685	538	4,699	952	959
FWP(Annualized)	78	61	535	108	109
Net change	-607	-477	-4,164	-844	-850
Forested Wetlands					
FWOP(Annualized)	489	245	1,755	641	807
FWP(Annualized)	262	43	310	113	143
Net change	-227	-202	-1,445	-528	-644
Total Net Change	-1,049	-930	-8,159	-2,505	-1,815

1. From Table 7.
2. Derived by multiplying total man-days per acre figure from Table 4 by annualized acreage; for FWP in forested wetlands the man-day per acre figure was reduced by 0.67, as per rationale presented in March 26, 1982, planning aid letter (Appendix D).
3. Derived by multiplying total value per acre figure from Table 4 by annualized acreage; for FWP in forested wetlands the value per acre figure was reduced by 0.67, as per rationale presented in March 26, 1982, planning aid letter (Appendix D).
4. Derived by multiplying total value per acre figure from Table 5 by annualized acreage; for FWP in forested wetlands the value per acre figure was reduced by 0.67, as per rationale presented in March 26, 1982, planning aid letter (Appendix D).
5. Derived by multiplying value per acre figure from Table 6 by annualized acreage; for FWP in forested wetlands the value per acre figure was reduced by 0.67, as per rationale presented in March 26, 1982, planning aid letter (Appendix D).

DISCUSSION

General

As previously indicated, certain modifications in the original project plans have been instituted which would reduce damages to fish and wildlife resources. However, under the presently selected plan unavoidable adverse impacts would still be severe. The most serious of these impacts involve enclosing significant wetland areas within the hurricane levee system and subsequently eliminating these habitats via forced drainage and conversion to levee, pasture, and various levels of more intensive development.

As indicated in the Description of Habitats section of this report, wetland habitats, particularly marsh, in the project area are being lost through saltwater intrusion, subsidence, and other "natural forces" at a very rapid rate; project construction would greatly accelerate this rate of loss. In comparison to future without-project conditions, project implementation would cause a net annualized loss of 1,049 acres of wetland habitats. Conversely, anticipated increases in levee and pasture habitat acreages would add little to the fish and wildlife value of the project area.

The non-monetary, habitat-based analysis (i.e., HEP analysis) of project impacts to fish and wildlife resources indicated a net annualized loss of 82,931 HU's. Measured in conventional, monetary terms, the project would cause an average annual reduction of 3,286 man-days of sport fishing (valued at nearly $13,000), 540,000 pounds in commercial harvest of estuarine-dependent finfishes and shellfishes (valued at over $133,000), 930 man-days of sport hunting (valued at over $8,000), and over $4,300 in fur harvest and wildlife-oriented recreation.

Inherent in the Fish and Wildlife Coordination Act is the concept that unavoidable project-induced impacts, resulting from a Federal project of this type, be offset via mitigation. Mitigation, as defined by the President's Council on Environmental Quality in the Regulations For Implementing the Procedural Provisions of the National Environmental Policy Act, can include:

> (a) avoiding the impact altogether by not taking a certain action or parts of an action; (b) minimizing impacts by limiting the degree or magnitude of the action and its implementation; (c) rectifying the impact by repairing, rehabilitating, or restoring the affected environment; (d) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and (e) compensating for the impact by replacing or providing substitute resources or environments.

Avoiding the adverse impacts totally, via the no action alternative, is apparently not acceptable to NODCE and local interests. Minimizing adverse impacts by excluding marsh and wooded wetlands from the area to be enclosed by the levee is also not acceptable to local interests. Since the wetlands to be enclosed would likely be drained and grazed, or converted to a higher

land use, there is no opportunity to rehabilitate, restore, or preserve and manage the affected environment.

Mitigation Options

After consideration of all of the various mitigation options listed above, only two appear viable and acceptable to NODCE and local interests. Those options, both involving offsite mitigation, include land acquisition and management or management of existing publicly-owned fish and wildlife habitat.

The FWS considers the wetland habitats to be impacted in the project area to be of relatively high value for the evaluation species used in the HEP analysis. Further, those habitats are becoming scarce on both a National and Statewide basis. Such criteria place the wetland habitats of the project area within Resource Category 2, according to the FWS's Mitigation Policy published in the Federal Register on January 23, 1981. That category carries with it the mitigation goal of "No Net Loss of In-Kind Habitat Value." Accordingly, that goal would apply to whichever mitigation option were ultimately selected.

The FWS Mitigation Policy also lists means and measures for compensating for unavoidable project-induced impacts in the general order and priority in which they should be recommended. First on that list are management activities to increase habitat values of existing areas, with project lands and nearby public lands receiving priority.

A tract of publicly-owned property, the Pointe-au-Chien Wildlife Management Area, lies just west of the project area and, as is the case with most coastal Louisiana wetlands, it is deteriorating rapidly from saltwater intrusion and subsidence. The area is sorely in need of a water management program which would halt, or at least retard, the rapid rate of wetland loss. Such a program, if properly designed, constructed, operated, and maintained, could increase and/or maintain the habitat value of the area to fish and wildlife resources over that which would be expected in the future if no management program were implemented. The benefit in increased habitat value could be used to offset the loss in habitat value which would result from implementation of the proposed hurricane protection levee.

Management of such public lands is totally consistent with the FWS Mitigation Policy, is one of the two remaining viable mitigation options, and is critically needed for maintenance of valuable publicly-owned fish and wildlife habitat. Accordingly, the FWS is supporting this mitigation option; the specifics of managing this area to offset project-induced impacts is discussed in the following sections of the report.

Mitigation Via Management of Pointe-au-Chien Wildlife Management Area Lands

To evaluate the adequacy of the management program being proposed for the Pointe-au-Chien Wildlife Management area in mitigating the project-induced losses of fish and wildlife resources, a HEP analysis was performed on the area selected for management. The analysis initially involved rating the

existing habitat quality of the area proposed for management using the same evaluation species used in the HEP analysis of project impacts. Subsequently, the analysis was expanded to include an estimate of the future quality and quantity of habitat in the area without a management program (i.e., the most probable future without-management condition) and an estimate of the future quality and quantity of habitat in the area under a proposed management program (i.e., the most probable future with-management condition). Assuming the management program yielded some benefit to fish and wildlife habitat, in quality and/or quantity, the difference (measured in average annual habitat units) between the future without-management condition and the future with-management condition would yield a measure of benefit from management which could be used to offset (if sufficient habitat units were produced via the management program) project-induced damages.

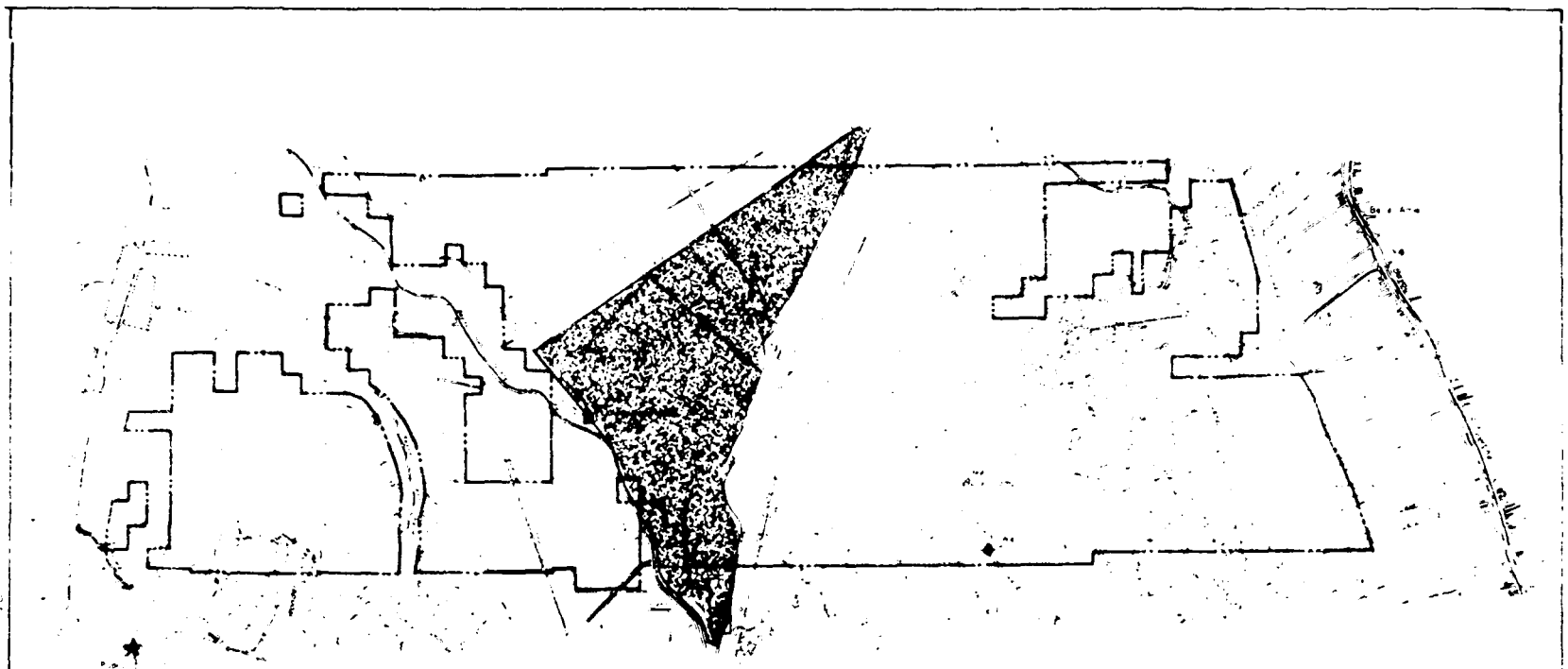
Similarly, a man-day/monetary analysis of human uses of fish and wildlife resources was performed to measure the difference between the future without- and future with-management plan for the mitigation area. Just as in the HEP analysis, any human-use benefits (measured in man-days and/or dollars) generated from the mitigation plan could be used to mitigate losses in those values which resulted from implementation of the hurricane protection project.

Baseline and Future Without-Management Conditions of Mitigation Area

The area selected for management as mitigation is an approximately 4,600-acre triangular-shaped marsh unit on the Pointe-au-Chien Wildlife Management Area (Figure 3). The United Gas Pipeline borders the area on the northwest; the St. Louis Canal and Bayou Pointe-au-Chien form the southwestern border; and Grand Bayou Canal, Grand Bayou, and Cutoff Canal form the eastern border of the unit (Figure 4).

Using the FWS's HEP analysis, previously described, habitat quality and quantity were established for baseline and future without-management conditions within the proposed mitigation area. Just as with estimating project-induced impacts, the 1976 version of the HEP was used. The same evaluation species were used in this analysis as those used in evaluating fish and wildlife losses due to the project. Four habitat types (i.e., fresh/intermediate marsh, brackish/saline marsh, open water, and upland developed) were identified within the mitigation area.

A number of randomly selected points within these habitat types were chosen as sample sites. A team of biologists representing the NODCE, the LDWF, and the FWS visited the sites and rated the habitat suitability (habitat unit value) of the various habitats for the selected evaluation species. Field data sheets for specific sample sites and assigned baseline-habitat unit values are available for review at the Lafayette, Louisiana, field office of the FWS. For analysis purposes, the habitat unit values were assumed to remain constant over project life in the future without-management condition. Those values are listed in Table 12.



POINTE AU CHIEN
WILDLIFE MANAGEMENT AREA

— mitigation area

ATCHAFALAYA TO VERMILION BAY, LOUISIANA
HURRICANE PROTECTION PROJECT

PROPOSED MITIGATION PLAN
MANAGEMENT AREA

U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

AUGUST 1982

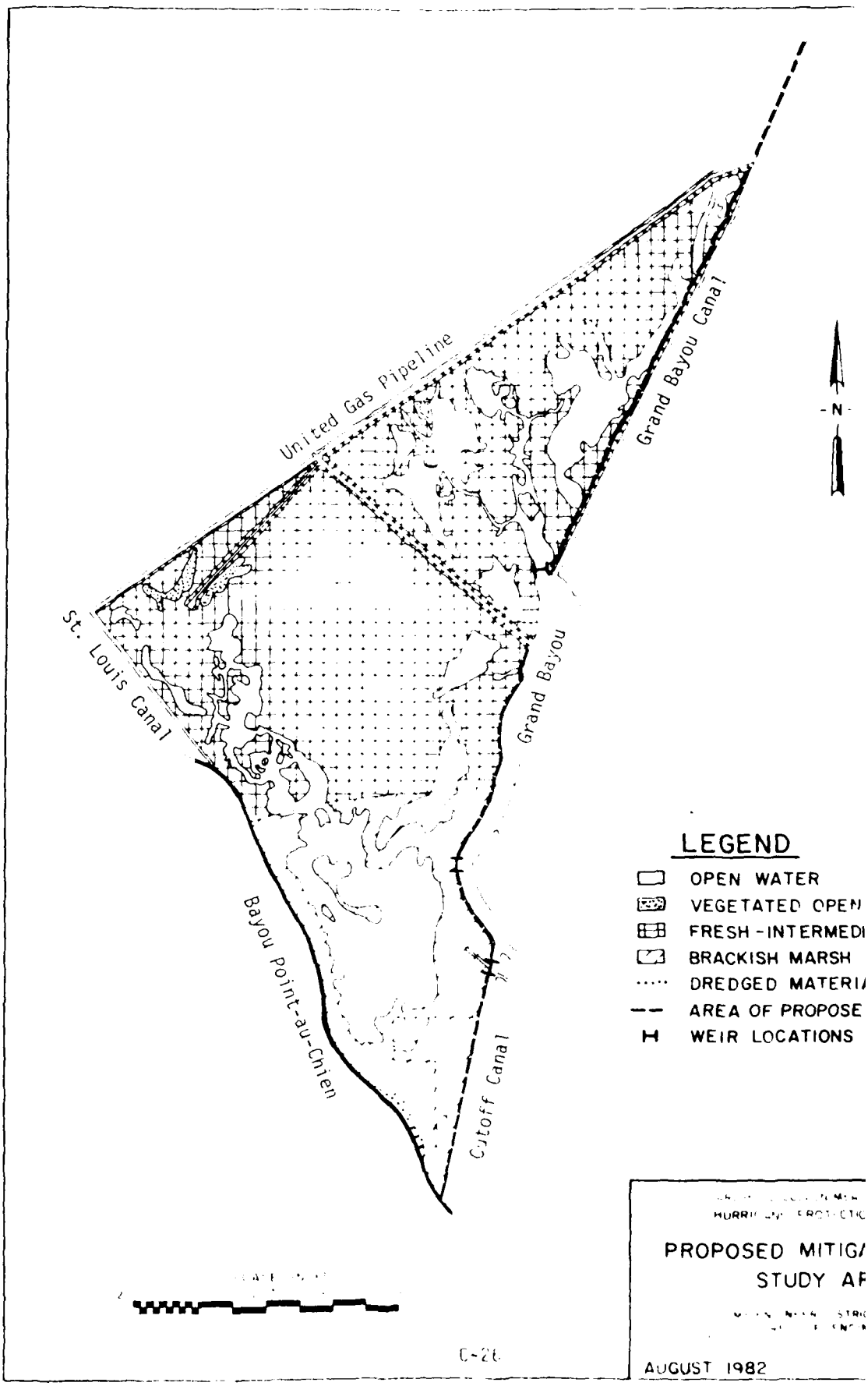

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Table 12. Habitat unit values of mitigation area for baseline and future without-management condition

Habitat type	Habitat unit value
Fresh/Intermediate Marsh	57.25
Brackish/Saline Marsh	39.00
Open Water	25.00
Upland	7.50

As a result of many factors, of which subsidence and saltwater intrusion are the most significant, habitats in the mitigation area are changing at a rapid rate. Information developed by Wicker (1980) and habitat maps generated for the years 1956 and 1978 were used to predict future without-management changes in habitat acreages within the mitigation area over the life of the project. For analysis purposes, it was assumed that future habitat changes within the mitigation area would continue to occur at the same rate that occurred during the period 1956 to 1978 within the entire area covered by the 1:24,000 scale Lake Bully Camp, Louisiana, topographic map(a majority of the mitigation area is contained within this map). Based on that assumption, future without-management habitat changes within the mitigation area were computed over the 100-year life of the project (Table 13).

Management Program for Mitigation Area

The ultimate goal in managing the selected mitigation area is to increase fish and wildlife habitat quality and/or quantity above that which would result without management. Within the selected mitigation area, many of the natural and man-made levees have deteriorated allowing rapid marsh degradation from saltwater intrusion. Extensive petroleum and sulfur mining-related boat traffic within perimeter waterways has contributed to erosion of banks and rapid breakup of the marsh, especially on the eastern border of the mitigation area. Compounding the problem of saltwater intrusion is the gradual loss of marsh via subsidence, a problem which is generally plaguing all of coastal Louisiana.

In order to slow the trend of marsh loss and/or conversion to more saline marsh types (estimated to be occurring at an average rate of 3 percent per year in the proposed mitigation area), specific structural features are being proposed for the mitigation area. These features involve levee construction and the installation of water control structures at strategic locations around the perimeter of the mitigation area.

Table 13. Habitat changes (acres) within the mitigation area in the future without-management condition

Target Year	Fresh/Intermediate Marsh	Brackish/Saline Marsh	Open Water	Upland	Total[2]
1984 (baseline)	2102	899	1494	103	4598
1985	2035	944	1515	104	4598
1990	1732	1137	1620	109	4598
1995	1473	1290	1720	114	4597
2010	907	1561	2000	129	4597
2035	404	1640	2399	154	4597
2085	80	1323	2990	204	4597
Annualized	652	1462	2330	154	4597

1. Totals vary slightly due to rounding errors.

The first element of the mitigation plan involves the construction of a levee along Grand Bayou and Cutoff Canal and improvement of an existing levee along the Grand Bayou Canal, forming the eastern border of the unit (Figure 4). The levee would be set back 50 feet from the edge of the waterways. Initially, the levee would be built to a height of +6 feet mean sea level, with an expected subsidence of 2 feet. According to NODCE data, the +4 foot elevation would be sufficient to protect against most incoming high tides. Additional lifts to be added to the levee, plus continued maintenance, would extend the functional life of the levee to 100 years.

The second element of the mitigation plan involves the installation of three fixed-level weirs along the reach of the newly constructed levee. The weirs would be constructed of timber and would have a crest elevation of 0.6 feet below marsh-floor elevation. These weirs would maintain a minimum water level inside the mitigation area and buffer saltwater intrusion from normal tidal exchange, while still allowing movement of estuarine organisms into and out of the marsh during above-normal tidal surges. The northernmost weir would be located near the confluence of Grand Bayou and the Grand Bayou Canal across an opening 85 feet wide. The second (middle) weir would be along Grand Bayou, about midway along the levee, across an opening 25 feet wide. The southern-most weir would be along Cutoff Canal, approximately 4,000 feet south of the second weir, across an opening 35 feet wide.

With those features in place, water levels and salinities are expected to stabilize (Chabreck, Hoar, and Larrick 1978) and, over the long term, salinities are expected to decrease. Within the first growing season after construction, unvegetated open water areas would begin to support aquatic vegetation such as Eurasian watermilfoil, tanwort, and widgeongrass (personal communication, Allan Ensminger, Louisiana Department of Wildlife and Fisheries, August 17, 1982). As salinities in the marsh area decrease, and with improved water-level control, annual grasses (e.g., wild millet and fall panicum) and sedges (e.g., leafy threesquare) would begin to invade.

Utilization of marsh and open water in the mitigation area by fish and wildlife would increase. Stabilized water levels would improve habitat conditions for furbearers such as nutria, muskrat, river otter, and alligator by allowing water to remain in interior canals even during drought conditions and by increasing the production of desirable food plants (Chabreck and Hoffpauir 1965). Wintering waterfowl would greatly benefit from the stabilized water levels and increased submergent and emergent aquatic vegetation (Spiller and Chabreck 1975). Although weirs may hinder the movement of certain estuarine species (e.g., croakers and penaeid shrimp) to and from marsh areas (Herke 1978), the benefit to accrue from the proposed weirs in reducing marsh loss should greatly outweigh such anticipated problems. Ultimately hunters, fishermen, and trappers would greatly benefit from increased usage of the mitigation area by fish and wildlife and by the maintenance of minimum water levels which would facilitate access within the area.

Future With-Management Condition of Mitigation Area

In order to estimate the benefit of the proposed mitigation plan, certain basic assumptions were made relative to anticipated changes in habitat quality and quantity that would result from the proposed management plan. It was assumed that only the portion of the habitat loss attributable to saltwater intrusion would be halted by implementation of the proposed management scheme. Habitat loss due to regional subsidence would continue, unaffected by the proposed management program. Accordingly, to project habitat losses due to subsidence within the mitigation area in the future with-management scenario, the rate of habitat loss that occurred from 1956 to 1978 within an area located northwest of the mitigation area (included in the 1:24,000-scale Bourg, Louisiana, topographic map) was applied to the mitigation area. That area is believed to be experiencing land loss due to subsidence and mineral exploration, only. It was concluded that projecting habitat loss due to the exploration of petroleum products could be more accurately accomplished by using historic trends within the 1:24,000-scale Lake Bully Camp, Louisiana, topographic map (the map which contains the bulk of the mitigation area). By applying those loss rates, and estimates of habitat benefits to accrue from management (discussed below), anticipated changes in habitat acreages within the mitigation area for the future with-management scenario were tabulated (Table 14). These figures were presented for target years 1984 (baseline), 1985 (date of completion of structural mitigation features), 1990 (date at which increases in HUV's are anticipated for the fresh/intermediate and open water habitats), 1995, 2010, 2035, and 2085 (the end of functional project life).

It was assumed (based on the previous description of anticipated habitat changes under management) that habitat quality (HUV) of the fresh/intermediate marsh and open water areas would improve within five years after completion of the structural mitigation features. For analysis purposes, it was assumed that the HUV for fresh/intermediate marsh would, within five years, be 61.25, the average HUV of intermediate marsh sites sampled (reference section titled Baseline and Future Without-Management Conditions of Mitigation Area) within the mitigation area (Table 15). Based on a description of anticipated increases in aquatic vegetation and reduced salinities in open water areas, provided by Allan Ensminger of the LDWF (personal communication, August 17, 1982), the interagency group estimated that the HUV for open water would reach 44.60 five years after implementation of the mitigation project (Table 15). The HUV's of remaining habitats (i.e., brackish/saline marsh and upland) were assumed to remain constant over the life of the mitigation project. Finally, it was assumed that within five years after construction (between 1985 and 1990) all remaining brackish/saline marsh would convert to fresh/intermediate marsh (Table 14).

Table 14. Habitat changes (acres) within the mitigation area in the future with-management conditions

Target Year	Fresh/Intermediate Marsh	Brackish/Saline Marsh	Open Water	Upland	Total[2]
1984 (baseline)	2102	899	1494	103	4598
1985	2053	870	1487	187	4597
1990	2901	0	1497	199	4597
1995	2879	0	1507	210	4596
2010	2815	0	1537	244	4596
2035	2712	0	1586	300	4598
2085	2516	0	1677	404	4597
Annualized	2687	30	1583	297	4597

1. Totals vary slightly due to rounding errors.

Table 15. Habitat unit values of mitigation area for baseline and future-with management scenario (FWMS)

Habitat type	Baseline	FWMS
Fresh/Intermediate Marsh	57.25	61.25
Brackish/Saline Marsh	39.00	39.00
Open Water	25.00	44.60
Upland	7.50	7.50

The product of the HUV's (Table 12 and 15) and the habitat acreages (Tables 13 and 14) in the future without- and future with-management conditions, respectively, yielded a measure (HU's) of the habitat quality and quantity under either condition (Table 16). Assuming that the future with-management condition produces HU's in excess of that available in the future without-management condition, the net annualized difference in HU's between these two conditions is attributable to the management program implemented. That net difference, if equal in quantity to the net annualized loss in HU's attributable to the hurricane protection project, would serve as mitigation for the project.

As in the project impact assessment, a man-day/monetary analysis of the future without- and future with-management scenario of the proposed mitigation area was also performed (Table 17). This analysis measured the tangible impacts upon human uses of fish, wildlife, and related recreational resources of the mitigation area. It was assumed that per/acre man-day/monetary estimates for various uses remained constant under the future without-management condition. Per/acre man-day estimates for the future with-management condition were assumed to follow the same trend as the HUV changes projected for that condition. In other words, since the brackish/saline marsh HUV did not increase with management, the per/acre man-day estimates were assumed to remain constant under that scenario over project life. Since the HUV of fresh/intermediate marsh was estimated to increase by 7 percent under the with-management scenario, the per/acre man-day estimate was also assumed to increase by that degree over project life. That same rationale was used in computing changes in fur harvest and wildlife-oriented recreation values for the future with- and future without-management conditions. In estimating the impact of management on sport fishing and commercial fishery harvest, it was assumed that harvest was directly related to the available marsh acreage (annualized) over project life.

Table 16. Comparison of future without-management (FWOM) and future with-management (FWM) habitat units within the selected mitigation area

Target Year	Habitat units by habitat type				
	Fresh/Intermediate Marsh	Brackish/Saline Marsh	Open Water	Upland	Total
1984 FWOM	120,340	35,061	37,350	773	193,524
FWM	120,340	35,061	37,350	773	193,524
1985 FWOM	116,504	36,816	37,875	780	191,975
FWM	117,534	33,930	37,175	1,403	190,042
1990 FWOM	99,157	44,343	40,500	817	184,817
FWM	177,686	0	66,766	1,493	245,945
1995 FWOM	84,329	50,310	43,000	855	178,494
FWM	176,339	0	67,212	1,575	245,126
2010 FWOM	51,926	60,879	50,000	968	163,773
FWM	172,419	0	68,550	1,830	242,799
2035 FWOM	23,129	63,960	59,975	1,155	148,219
FWM	166,110	0	70,736	2,250	239,096
2085 FWOM	4,580	51,597	74,750	1,530	132,457
FWM	154,105	0	74,794	3,030	231,929
Annualized FWOM	37,318	57,018	58,244	1,151	153,731
FWM	164,304	1,181	69,600	2,223	237,308
Net Change	+126,986	-55,837	+11,356	+1,072	+83,577

Table 17. Comparison of man-day/monetary values for future without-management (FWOM) and future with-management (FWM) habitat conditions within the selected mitigation area for selected fish and wildlife related parameters

Habitat Types	Acres[1]	Commercial[2] Fishery Harvest (millions of pounds)	Commercial[3] Fishery Value (dollars)	Sport[4] Fishing Use (man-days)	Sport[5] Fishing Value (dollars)	Sport[6] Hunting Potential (man-days)	Sport[7] Hunting Value (dollars)	Fur Catch[8] Value (dollars)	Wildlife-Oriented Recreation Value (dollars)[9]
Fresh/Intermediate Marsh									
FWOM(Annualized)	652	0.42	105,000	2,608	10,171	762	7,733	3,436	813
FWM(Annualized)	2,687	1.75	437,500	10,748	41,917	3,358	32,868	15,152	4,025
Net change	+2,035	+1.33	+332,500	+8,140	+31,746	+2,596	+25,135	+11,716	+3,112
Brackish/Saline Marsh									
FWOM(Annualized)	1,462	0.95	237,500	5,848	22,807	1,148	10,029	2,032	2,047
FWM(Annualized)	30	0.02	5,000	120	468	24	206	42	42
Net change	-1,432	- .93	-232,500	-5,728	-22,339	-1,124	-9,823	-1,990	-2,005
Upland									
FWOM(Annualized)	154	-	-	-	-	77	276	202	254
FWM(Annualized)	297	-	-	-	-	149	535	389	490
Net change	+143	-	-	-	-	+72	+259	+187	+236
Total Net Annual Change Under Management	-	+0.40	+100,000	+2,412	+9,407	+1,544	+15,571	+9,913	+1,343

1. From Tables 13 and 14.
2. Product of 650.39 pounds of commercial harvest/acre of marsh (generated in Table 2) and annualized marsh acreage.
3. Product of $0.25/pound (generated in Table 2) and pounds of commercial fishery harvest; based on assumptions in text, upland habitat would not contribute to commercial fishery harvest.
4. Product of 4 man-days per acre usage figure (from Table 2) and the marsh acreage available.
5. Product of $3.90 (from Table 2) and man-days of sport fishing use.
6. Derived by multiplying total man-day per acre figure from Table 4 by annualized acres available; for FWM in fresh/intermediate marsh the man-day per acre figure was increased by 0.07 as per rationale in text; for upland habitat, man-day per acre figure was assumed to be equal to FWOP man-day value for forested wetlands.
7. Derived by multiplying value per acre figure from Table 6 by annualized acres available; for upland habitat, value per acre figure was assumed to be equal to forested wetlands value.
8. Derived by multiplying total value per acre figure from Table 5 by annualized acres available; for FWM in fresh/intermediate marsh, the total value per acre figure was increased by 0.07 as per rationale in text; for upland habitat, the total value per acre figure was assumed to be equal to forested wetlands value.
9. Derived by multiplying value per acre figure from Table 6 by annualized acres available; for FWM in fresh/intermediate marsh the value per acres figure was increased by 0.07 as per rationale in text; for upland habitat, the value per acre figure was assumed to be equal to forested wetlands value.

Due to the proximity of the proposed mitigation area to the hurricane protection levee project area and to the very nature of the estimates of baseline commercial fishery and fur harvest rates and sport fishing and hunting and wildlife-oriented recreation potentials, baseline figures (reference Tables 2, 3, 4, 5, and 6) for the project area were applied to the mitigation area. The unit monetary values of sport and commercial fish and wildlife harvests and recreational uses were assumed to remain constant over project life. Just as with the HEP analysis, if the future with-management scenario produces human-use values (i.e., man-days and/or monetary value) in excess of that available in the future-without management condition, the net annualized difference can be applied as compensation for losses in those values which would result from implementation of the hurricane protection project.

CONCLUSIONS

Although wetland habitats, particularly marsh, in the project area are being lost through saltwater intrusion, subsidence, and other "natural forces" at a very rapid rate, construction of the proposed hurricane protection levee would cause losses in wetland habitats substantially in excess of that which would be expected to occur in the future without-project condition. The proposed project should not adversely impact endangered or threatened species, nor species proposed for such listing, since none are expected to occur in the project area. The project will, however, cause a net annualized loss of 822 acres of marsh and 227 acres of forested wetlands and, concomitantly, have a significant adverse impact on the fish and wildlife resources which those habitats support. The habitat-based analysis (i.e., HEP analysis) of project impacts to those resources indicated a net annualized loss of 82,931 HU's. Measured in conventional, monetary terms, the project would cause an average annual loss of 540,000 pounds of commercial fishery harvest valued at over $133,000; 3,286 man-days of sport fishing valued at nearly $13,000; nearly 930 man-days of sport hunting valued at over $8,000; over $2,500 in fur harvest; and over $1,800 in wildlife-oriented recreation.

Since project modifications to eliminate these adverse impacts to fish and wildlife resources have been deemed impractical or undesirable from the view point of the construction agency and/or the local sponsors, the only acceptable alternative to ensure equal consideration of fish and wildlife resources would be to provide off-site mitigation for those "unavoidable" project-induced impacts. Consistent with the mitigation policy established by the FWS, a tract of publicly-owned property on the Pointe-au-Chien Wildlife Management Area has been selected for management, with the goal of improving habitat quality and/or quantity above that which would occur in the future, without any structured management program. If the management program were successful, this improved condition, measured in both HU's and in human-use values, would serve to mitigate or compensate for unavoidable project damages to similar habitats.

The HEP analysis performed on the proposed mitigation area indicated that implementation, operation, and maintenance of a sound, structural management program could produce an average annual excess of 83,577 HU's (Table

16). That excess would adequately compensate for the project-induced annual loss of 82,[illegible] HU's, previously referenced. However, analysis of the impact of the mitigation program on human-use values (i.e., man-day monetary analysis) indicated that the program would vary in its ability to compensate for the project-induced losses of those values (Tables 10, 11, and 12). Approximately 400,000 pounds of the over 500,000-pound annual loss of commercial fishery harvest and only 2,400 of the nearly 3,300 man-days of sport fishing lost annually as a result of the project would be replaced via the mitigation plan. Even after implementation of the proposed management plan, then, a significant deficit in coastal Louisiana's sport fishing potential and commercial fishery harvest would exist due to implementation of the hurricane protection project. Conversely, sport hunting potential and its attendant monetary value, produced via the mitigation plan, would almost double sport hunting potentials which would be lost with project implementation. Nearly four times the loss in fur harvest value associated with the hurricane protection project would be replaced by the mitigation plan, while increased wildlife-oriented recreation values produced under the mitigation plan would be slightly below that required to fully compensate for those values lost through project construction.

It has been concluded, then, that the proposed mitigation plan, if implemented simultaneously with renewed project construction, would in most respects adequately compensate for project-induced losses to fish and wildlife resources. It has been further concluded that much of the Pointe-au-Chien Wildlife Management Area outside of the proposed mitigation area (approximately 23,000 acres) will continue to deteriorate and be lost to subsidence and erosion at an ever increasing rate. Inasmuch as this continued marsh loss is a primary result of eliminating freshwater and sediment transport due to levee construction along the Lower Mississippi River and, in particular, elimination of Bayou Lafourche as a distributary of the Mississippi River, it would seem appropriate to support, via project funding, enhancement of that portion of the Wildlife Management Area not proposed for inclusion in the mitigation proposal. Such enhancement is provided for via the General Water Project Review Act, Public Law 89-72, as amended (16 U.S.C. 460 - 1 (12), et seq.). In this case, the Act would provide that initial implementation costs of the enhancement program for sport fish and wildlife resources be cost-shared on a 75 percent Federal and 25 percent non-Federal basis. In addition, non-Federal interests would assume all costs for operation, maintenance, and replacement of structural enhancement features. Present reporting deadlines do not allow additional discussion of the need for such an enhancement program nor the management concept which would generate enhancement benefits; therefore, expansion of the enhancement concept will be included in the Final Coordination Act Report for this project.

RECOMMENDATIONS

Based on a review of the currently selected plan for the Larose to Golden Meadow, Louisiana, Hurricane Protection Project, the FWS recommends that the following measures, many of which were contained in past letter reports

dealing with this project be implemented to ensure equal consideration of fish and wildlife resources:

1. The levee south of Yankee Canal and east of Bayou Lafourche shall be realigned to, as nearly as possible, follow the natural levee along Bayou Lafourche (Appendix A, Figure 2).

2. In the Clovelly Farms area (Appendix C, Figure 1):

   a. all borrow material shall be obtained from upland sources or from existing borrow canals, and

   b. the enclosure of the triangle of marsh near the northwest corner of Clovelly Farms shall be deleted from project plans.

3. In the LL&E area (Appendix C, Figure 1):

   a. no borrow material shall be removed from intermediate marsh, brackish marsh, or forested wetlands,

   b. the proposed levee segment located north of Centerline Station 224+00 shall be moved west of its present alinement to avoid destruction of forested wetlands along the Bayou Raphael ridge,

   c. the proposed levee segment located between Baseline Stations 66+63 and 77+38 shall be realigned approximately 170 feet to the east to avoid impacts on nesting cover at a wading bird nesting colony located in that segment, and

   d. construction activity shall be prohibited between Baseline Stations 29+00 and 99+00 during the period of February 15 to August 15 of each year in order to minimize disturbance of the wading bird rookery.

4. The levee north of Breton Canal and east of Bayou Lafourche shall be realigned to exclude the nearly 1,700 acres of wetlands in that area from levee protection, or water control structures, that would remain open during normal water periods to allow for tidal exchanges through the levee system, shall be constructed in the proposed levee to preserve the integrity of those wetlands (Appendix D, plate 1, reference Potential Mitigation Area).

5. If the above recommendations cannot be implemented as an integral part of this hurricane protection project, the full extent of unavoidable adverse impacts to fish and wildlife resources shall be mitigated via implementation of the water management plan for the Point-au-Chien Wildlife Management Area, as outlined in the text of this report, concurrently with construction of the hurricane protection project.

6. In view of the fact that the remainder of the wetlands of the Pointe-au-Chien Wildlife Management Area not proposed for inclusion under the mitigation proposal will continue to deteriorate at an ever increasing rate, a program to enhance the fish and wildlife habitat of that area shall be implemented, as provided for in the Federal Water Project Recreation Act, Public Law 89-72, as amended. That enhancement proposal is being developed cooperatively by the FWS and the LDWF, in consultation with the National Marine Fisheries Service.

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U.S. Army Corps of Engineers. 1977. Value of wetlands and bottom hardwoods. New Orleans District, New Orleans. mimeograph,

Appendix A

United States Department of the Interior
FISH AND WILDLIFE SERVICE
17 EXECUTIVE PARK DRIVE, N. E.
ATLANTA, GEORGIA 30329

July 3, 1975

District Engineer
U.S. Army Corps of Engineers
New Orleans, Louisiana

Dear Sir:

Reference is made to our letter dated December 10, 1974, prepared in response to public notice LMNED-DL (Levee Construction Larose to Golden Meadow Hurricane Protection project), dated November 1, 1974. In our letter, you were informed that prior Fish and Wildlife Service reports did not adequately assess the damages to fish and wildlife resources associated with the valuable coastal wetlands within the project area and that a revised report would be prepared with a view toward minimizing destruction of these resources. This revised report is submitted in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

PROJECT DESCRIPTION

The Larose to Golden Meadow, Louisiana, Hurricane Protection project (formerly Grand Isle, Louisiana, and vicinity Hurricane Protection project) was authorized by Public Law 89-298, 89th Congress, and approved October 27, 1965. The project area extends along both banks of Bayou Lafourche from Larose, Louisiana, to approximately 2 miles south of Golden Meadow, Louisiana, (figure 1). The project is divided into six sections. The dredging work within these units consists of construction of approximately 4 miles of new levees, enlargement of about 41 miles of existing non-Federal levees, and construction of 2 navigable flood-control structures in Bayou Lafourche near Larose and Golden Meadow, Louisiana. The existing non-Federal levee will be enlarged by placing material along the new levee centerline in a series of lifts which will either straddle the existing levee or be located adjacent to it. In areas where levees are not present, material will be placed in the marsh along the new levee centerline in a series of lifts. Throughout most of the project reach, the borrow areas will be located on the protected side of the new levee; however, two sections will utilize borrow areas located outside the new levee.

RESOURCES WITHOUT THE PROJECT

Fish and wildlife values vary from section to section, therefore, these resources will be described separately.

Section A

The western portion of this section contains some brackish marsh but has been extensively diked and drained. Construction of this portion is under way. Fish and wildlife resources in this segment are considered low to moderate.

The eastern portion of this section, which lies south of Yankee Canal and east of Bayou Lafourche, contains approximately 2,700 acres of brackish marsh[1] and associated tidal ponds and streams (figure 1). Predominant vegetation in this marsh is saltmeadow cordgrass (Spartina patens), saltmarsh cordgrass (Spartina alterniflora), and saltgrass (Distichlis spicata). Decaying vegetation is transported by tidal action from the marsh to the ponds and tidal creeks of the area, thereby supplying detritus and nutrients valuable in the maintenance of a high level of biological productivity. The undrained wetlands in this project segment provide suitable habitat for numerous juvenile and adult fishes and shellfishes. Included among these are spotted seatrout, sand seatrout, Atlantic croaker, black drum, red drum, spot, southern kingfish, silver perch, sheepshead, spadefish, southern flounder, sea catfish, gafftopsail catfish, striped mullet, menhaden, blue crab, brown shrimp, and white shrimp. Other organisms used as food by sport and commercial fishes are also found in the project area including mud crabs, bay anchovy, grass shrimp, and killifishes. The marshes and open-water areas of this project segment are also capable of providing life support elements to herons, egrets, ibises, bitterns, rails, muskrats, river otter, nutria, raccoon, and mink. Migratory waterfowl found in and adjacent to the project area include American coot, pintail, mallard, American widgeon, mottled duck, blue-winged teal, green-winged teal, gadwall, lesser scaup, ring-necked duck, and northern shoveller. The Golden Meadow Floodgate spoil stockpile area, which comprises over 15 acres, is located immediately adjacent to this area and is also composed of brackish marsh.

Section C

A large portion of the wetlands in this project segment have been extensively diked and drained. However, approximately 850 acres of

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1. Chabreck, R. H., "Vegetation, Water and Soil Characteristics of the Louisiana Coastal Zone." Louisiana Agricultural Experiment Station Bulletin No. 664. 1972.

coastal shallow and deep fresh marsh and wooded swamp[2] in the Belle Amie area remain relatively unaltered (figure 1). Dominant vegetation in the area consists of bulltongue (Sagittaria falcata), while other common perennials include cattail (Typha spp.) and southern bulrush (Scirpus californicus). Dwarf spikerush (Eleocharis parvula) and annual grasses and sedges, valuable as waterfowl food, are also abundant. This area supports numerous wildlife species including snowy egrets, great egrets, little blue herons, night herons, black-necked stilts, ibises, clapper rails, gallinules, Forster's terns, and lesser yellowlegs. Migratory waterfowl, seasonally abundant in this area, include mallard, pintail, American widgeon, gadwall, blue-winged teal, green-winged teal, mottled duck, and American coot. The American alligator, presently listed as an endangered species,[3] also inhabits this area. Suitable habitat is also provided for nutria, muskrat, raccoon, mink, and river otter. Through tidal action and surface runoff, nutrients and detritus are transported from these wetlands to adjacent estuarine waters. These wetlands therefore contribute to the production of important sport and commercial finfishes and shellfishes. Estuarine organisms tolerant of low salinities, such as blue crab and striped mullet, are also found in this area.

Local interests have applied for a Department of the Army permit, LMNOD-SP (Lafourche Parish Wetlands)20, to construct and maintain levees and a closure dam that would result in the reclamation of these wetlands. However, the Fish and Wildlife Service, in a letter dated January 16, 1975, recommended that the permit be denied. The permit has not been issued, and we have assumed, for purposes of our evaluation of the effects of the project, that it will not be issued.

Sections B, D, E, and F

Wetlands of these project segments have been extensively diked and drained. Relatively small undrained portions of these segments consist of coastal shallow and deep fresh marsh and wooded swamp (wetlands types 12, 13, and 7), and provide essential life support elements to wildlife species common to the Belle Amie area previously described.

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2. U.S. Department of the Interior, Fish and Wildlife Service, "Wetlands of the United States," Circular 39. Issued 1956. Reissued 1971.

3. U.S. Department of the Interior, Fish and Wildlife Service, "United States List of Endangered Fauna." May 1974.

RESOURCES WITH THE PROJECT

Section A

Construction of the project as currently planned will have a major adverse and irreversible impact on valuable fish and wildlife resources in the eastern portion of this project segment. Levee closure and subsequent drainage will destroy approximately 2,700 acres of valuable brackish marsh with a corresponding loss of attendant fish and wildlife.

Section C

Accomplishment of the work as proposed in the Belle Amie area of this project segment would have severe adverse impacts on fish and wildlife resources. An estimated 750 acres of valuable freshwater marsh and 100 acres of wooded swamp would be segmented from the surrounding wetlands and would be eventually drained and converted to agricultural, residential, and commercial uses. The value of the enclosed area to wetland wildlife species would be virtually eliminated and its fishery resource value destroyed.

Sections B, D, E, and F

Completion of these project segments will eventually lead to the drainage of the relatively small undrained wetland areas in these segments with a corresponding loss of their wildlife value. However, opportunities for project modifications which would greatly reduce these losses are negligible.

DISCUSSION

Harris, in a study of Louisiana estuarine-dependent commercial fishery production,[4] stated his belief that high-priced fishes and shellfishes (seatrout, crabs, shrimp, and oysters) are presently undergoing maximum commercial exploitation. He also believes that total production has peaked and will decline in proportion to the acreage of marshland lost to forces such as subsidence, erosion, saltwater intrusion, drainage, hurricane protection projects, pollution, or industrial and housing

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4. Harris, A. H., "Louisiana Estuarine Dependent Commercial Fishery Production and Values," (Regional Summary and WRPA-9 and WRPA-10 Analysis of Production and Habitat Requirements). Unpublished report prepared for U.S. Department of Commerce, National Marine Fisheries Service, Water Resources Division, St. Petersburg, Florida.

developments. The results of other studies[5] of coastal Louisiana have shown that its wetlands are now being lost at the alarming rate of over 16.5 square miles per year. This loss is attributed to subsidence, compaction, erosion, and construction activities, and has been greatly accelerated by the construction of flood-control levees and reservoirs throughout the Mississippi River system. In view of this loss, it is imperative that all responsible agencies strive to preserve as much marshland as possible in order to mitigate the impact of this loss on activities such as commercial and sport fishing, hunting, and fur production.

Although the Fish and Wildlife Service is not opposed to the protection of developed areas from damaging floods, we cannot condone the unnecessary reclamation of thousands of acres of productive wetlands located adjacent to sparsely populated areas. Congress, as well as numerous Federal agencies, has placed a much higher priority on the preservation of estuarine and associated wetlands and on more careful planning for overall environmental quality. Construction of hurricane protection levees as proposed in the eastern portion of section A and in the Belle Amie portion of section C will provide flood protection to wetland areas which thrive on periodic inundation. In these two project segments, flood-protection levees could be constructed on or immediately adjacent to nonwetland sites for which flood protection is needed or in order to keep the overall protection plan intact. This alternative would provide adequate flood protection and would greatly reduce damages to fish and wildlife resources in the project area.

RECOMMENDATIONS

Thousands of acres of valuable fish and wildlife habitat have already been leveed and drained throughout the project area as a result of privately constructed and maintained protection levees. This Service therefore recommends that the following project modifications be adopted so that fish and wildlife losses may be reduced:

1. the levee south of Yankee Canal and east of Bayou Lafourche be relocated to the natural levee along Bayou Lafourche or immediately adjacent thereto (figure 2);

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5. Chatry, F. M., and S. M. Galiano, "Shaping and Reshaping a Delta - Technology and Nature Collaborate." Reprinted, with minor modifications, from Fall 1970 issue of Water Spectrum magazine.

2. the portion of the section C levee associated with the undrained wetlands near Belle Amie be relocated as closely as possible to nonwetland areas adjacent to Belle Amie (figure 2) and such areas extend an approximate distance of 0.25 mile west of Louisiana Highway 1 at Belle Amie;

3. the floodgate stockpile to be located in section A be relocated to the west side of Bayou Lafourche within the area enclosed by the levee system (figure 2); and,

4. all borrow material utilized in construction of the realigned segments of sections A and C referenced above be obtained from the areas to be enclosed.

This report has been reviewed and concurred in by the National Marine Fisheries Service and the Louisiana Wild Life and Fisheries Commission. Copies of Regional Director Stevenson's and Director Angelle's letters of concurrence are attached.

We would welcome the opportunity to meet with your staff to discuss our areas of concern. Please keep us advised of the status of this project.

Sincerely yours,

Kenneth E. Black

Regional Director

Attachments 4

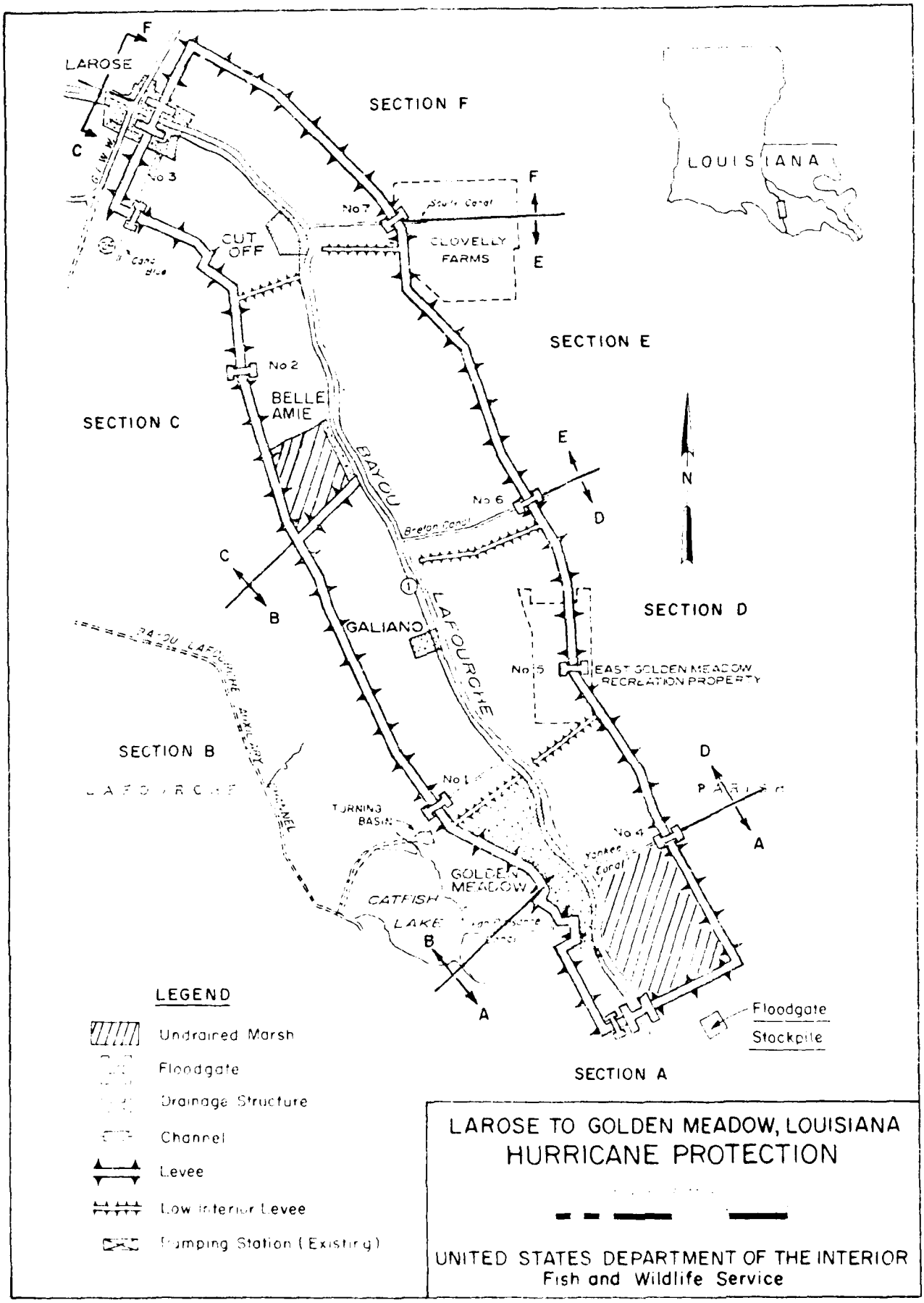
LAROSE
SECTION F
LOUISIANA
No 3
No 7
CUT OFF
CLOVELLY FARMS
SECTION E
No 2
BELLE AMIE
SECTION C
BAYOU
No 6
N
GALIANO
LAFOURCHE
SECTION D
No 5
EAST GOLDEN MEADOW RECREATION PROPERTY
SECTION B
No 1
TURNING BASIN
No 4
GOLDEN MEADOW
CATFISH LAKE
SECTION A
LEGEND
Undrained Marsh
Floodgate
Drainage Structure
Channel
Levee
Low Interior Levee
Pumping Station (Existing)
Floodgate
Stockpile
LAROSE TO GOLDEN MEADOW, LOUISIANA
HURRICANE PROTECTION
UNITED STATES DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service

FIGURE 1

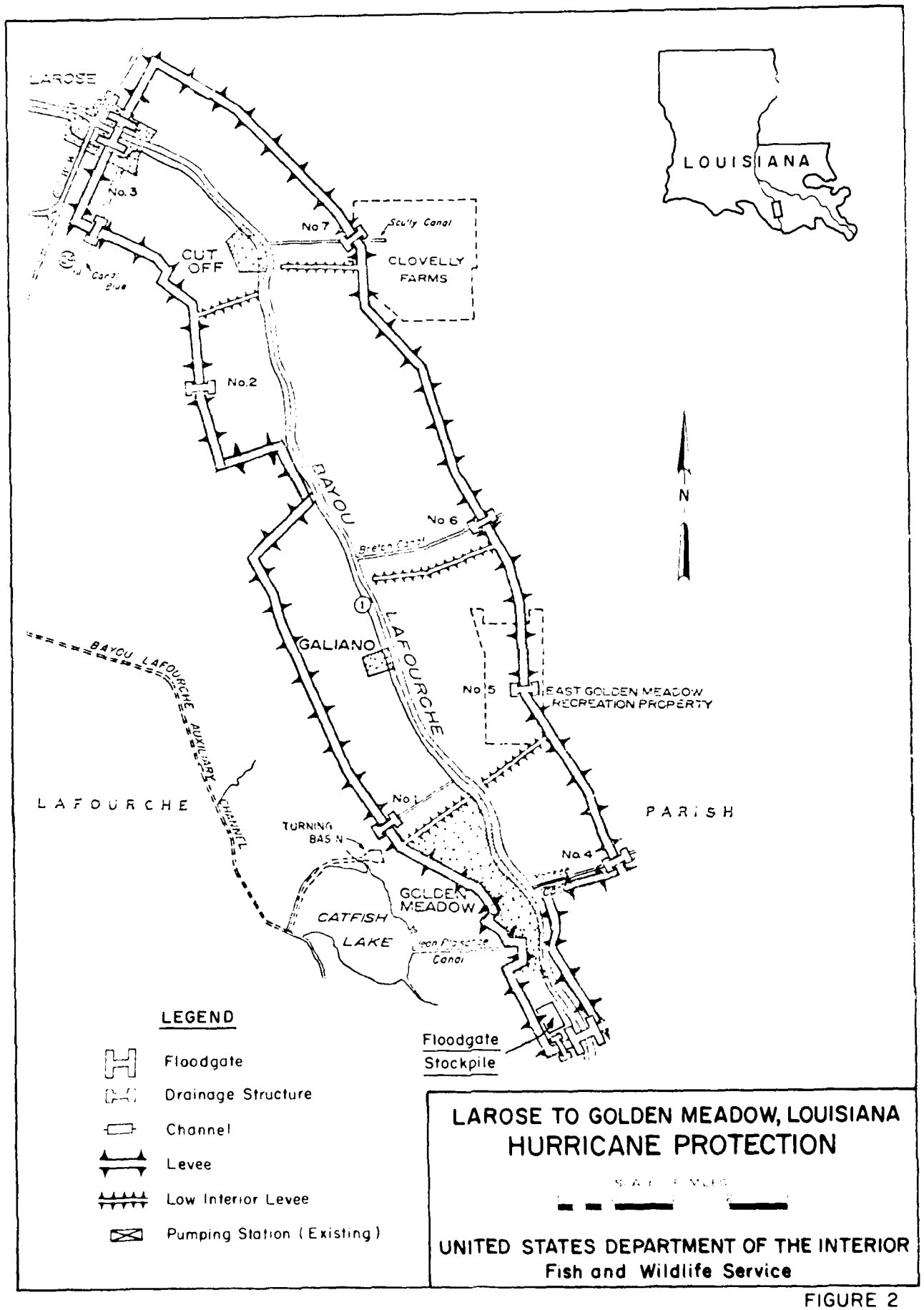
LAROSE
No. 3
No. 7
Scully Canal
CUT OFF
CLOVELLY FARMS
No. 2
BAYOU LAFOURCHE
No. 6
GALIANO
No. 5
EAST GOLDEN MEADOW RECREATION PROPERTY
BAYOU LAFOURCHE AUXILIARY CHANNEL
LAFOURCHE PARISH
No. 1
TURNING BASIN
No. 4
GOLDEN MEADOW
CATFISH LAKE
Canal
LOUISIANA
N
LEGEND
Floodgate
Drainage Structure
Channel
Levee
Low Interior Levee
Pumping Station (Existing)
Floodgate
Stockpile
LAROSE TO GOLDEN MEADOW, LOUISIANA
HURRICANE PROTECTION
UNITED STATES DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service

FIGURE 2

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Duval Building
9450 Gandy Boulevard
St. Petersburg, FL 33702

May 7, 1975 FSE21/DM

Mr. Kenneth E. Black
Fish and Wildlife Service
17 Executive Park Drive, N.E.
Atlanta, GA 30329

Dear Mr. Black:

Reference is made to Mr. John D. Green's letter dated April 22, 1975, concerning the review draft of your revised report on the authorized levee construction Larose to Golden Meadow, hurricane protection project, you are submitting in accordance with provisions of the Fish and Wildlife Coordination Act, as amended.

Your findings and recommendations support the concerns regarding this project we expressed to the District Engineer, New Orleans District, by letter dated December 13, 1974, in response to Public Notice LMNED-DL (Levee Construction Larose to Golden Meadow, Hurricane Protection Project) dated November 1, 1974. Therefore, we concur in your draft report.

Sincerely,

for William H. Stevenson
Regional Director

State of Louisiana

NEW ORLEANS 70130

May 7, 1975

Mr. John D. Green
Regional Supervisor
Division of Ecological Services
Fish and Wildlife Service
17 Executive Park Drive, N. E.
Atlanta, Georgia 30329

Dear Sir:

Personnel of the Louisiana Wildlife and Fisheries Commission have reviewed your proposed report on the Larose to Golden Meadow, La., Hurricane Protection Project. We believe the report adequately describes the adverse impacts on fish and wildlife resources which would result if the project, as currently planned, is implemented.

Our agency certainly is not opposed to flood protection for heavily populated areas. However, improved project planning could significantly reduce losses of productive wetlands supporting abundant fish and wildlife resources. We are, therefore, in concurrence with the project modifications as outlined in the proposed report.

We appreciate the opportunity to review and comment on the proposed report of the subject project.

Sincerely yours,

J. Burton Angelle
Director

JBA:CK:tam

Appendix B

United States Department of the Interior
FISH AND WILDLIFE SERVICE
17 EXECUTIVE PARK DRIVE, N. E.
ATLANTA, GEORGIA 30329

January 9, 1976

District Engineer
U.S. Army Corps of Engineers
New Orleans, Louisiana

Dear Sir:

Reference is made to your letter dated October 3, 1975, LMNED-DL, regarding the authorized project, "Larose to Golden Meadow Hurricane Protection Project, Louisiana." This supplemental report is submitted in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). Your letter and an attached map were prepared in response to our July 3, 1975, revised report on this project which recommended changes in project plans in order to reduce damages to fish and wildlife resources. These recommendations are listed below and discussed in relation to comments contained in your October 3, 1975, letter.

Recommendation 1: The levee south of Yankee Canal and east of Bayou Lafourche be relocated to the natural levee along Bayou Lafourche or immediately adjacent thereto.

Remarks: According to your October 3, 1975, letter, the existence of a producing oil field, numerous pipelines and other oilfield facilities, and probable difficulties with acquisition of rights-of-way preclude adoption of this recommendation. However, you have initiated action to utilize an alternate alignment which would reduce wetland destruction by approximately 800 acres. We are pleased to note this alteration of project plans that will significantly reduce damages to wetland-associated fish and wildlife. However, an estimated 1,900 acres of valuable brackish marsh and associated ponds and streams will be destroyed by utilization of this alternate plan. A substantial loss of potential hunting opportunities will result from this action. This includes an estimated potential annual loss of 585 man-days of small-game hunting and 445 man-days of waterfowl hunting.

It is estimated that commercial fur production will incur an annual loss of 346 pelts per year. Commercial fishery losses resulting from the elimination of 1,900 acres of valuable estuarine wetlands in the Yankee Canal area will also be substantial. Approximately 578,000 pounds of commercial estuarine-dependent production will be lost annually.

Recommendation 2: That portion of the section C levee associ with the undrained wetlands near Belle Amie be relocated as c as possible to nonwetland areas adjacent to Belle Amie, and s areas extend an approximate distance of 0.25 mile west of Lou Highway 1 at Belle Amie.

Remarks: It is noted in your October 3, 1975, letter that im mentation of this alternative is not considered feasible beca of greatly increased construction and maintenance costs and difficulties and delays associated with obtaining rights-of-w This will necessitate implementation of the original plan, wi an associated elimination of approximately 750 acres of fresh marsh and 100 acres of wooded swamp. Estimated annual losses of potential hunting opportunities associated with this destr of wetland habitat are substantial and include 344 man-days o small-game hunting and 95 days of waterfowl hunting. Fur production in these wetlands will be reduced by an estimated 453 pelts annually. Commercial fishery losses will also be severe with the implementation of this project feature. An estimated 259,000 pounds of estuarine-dependent fishery produ will be lost annually.

Recommendation 3: The floodgate stockpile to be located in s A be relocated to the west side of Bayou Lafourche within the enclosed by the levee system.

Remarks: Since you will now relocate this feature to an area inside the protected area, damages will be reduced accordingl

Recommendation 4: All borrow material utilized in the construction of the realigned segments of sections A and C be obtained from the areas to be enclosed.

Remarks: We are pleased to note that this recommendation will also be implemented. This action will reduce the impact of the project on adjacent marsh.

DISCUSSION

Substantial changes in project plans have been instituted to reduce damages to fish and wildlife resources. However, these damages will still be quite severe. Approximately 1,900 acres of brackish marsh, 750 acres of fresh marsh, and 100 acres of wooded swamp will be eliminated by completion of the project as now planned. It is therefore apparent that alterations in levee alignments will not be sufficient to adequately compensate for the severe damages to these valuable resources. The only project modification we are aware of that will eliminate this destruction of valuable wetlands is the incorporation of water-control structures into the Belle Amie and Yankee Canal levee segments. These structures would allow tidal exchange with adjacent waters under normal conditions, but would be closed preceding and during hurricanes. This system would be designed to provide hurricane flood protection to existing residential areas while preserving the character of the enclosed wetlands. If this alteration in project plans is not implemented, adequate compensation for project damages to fish and wildlife resources can only be provided by the purchase of marshlands for the purpose of intensive fish and wildlife management.

Section 663(c) of the Fish and Wildlife Coordination Act states: "When consistent with the purposes of sections 661 to 666c of this title and the reports and findings of the Secretary of the Interior ..., land, waters, and interests therein may be acquired by Federal construction agencies for the wildlife conservation and development purposes of sections 661 to 666c of this title as reasonably needed to preserve and assure for the public benefit the wildlife potentials of the particular project area ...." (emphasis added). It is therefore recommended that marshlands located adjacent to the nearby Pointe-au-Chien Wildlife Management

Area be purchased in a quantity similar to that to be eliminated by the project, and transferred to the Louisiana Wild Life and Fisheries Commission for management. The location of these lands is shown on the attached map. We wish to point out that acquisition and development costs and annual operation and maintenance costs for mitigation purposes are properly charged as a project cost. We realize that this acquisition must be authorized by Congress following a specific request for such authority by your agency. However, we are confident that you will recognize the need to mitigate the substantial losses of valuable coastal wetlands and their attendant fish, wildlife, and related resources associated with this project.

This report has been reviewed by the National Marine Fisheries Service and the Louisiana Wild Life and Fisheries Commission. Copies of Regional Director Stevenson's letter of comment and Director Angelle's letter of concurrence are attached.

Please advise us of your action on our recommendations.

Sincerely yours,

Larry R. Vaughn

Acting
Regional Director

Attachments - 3

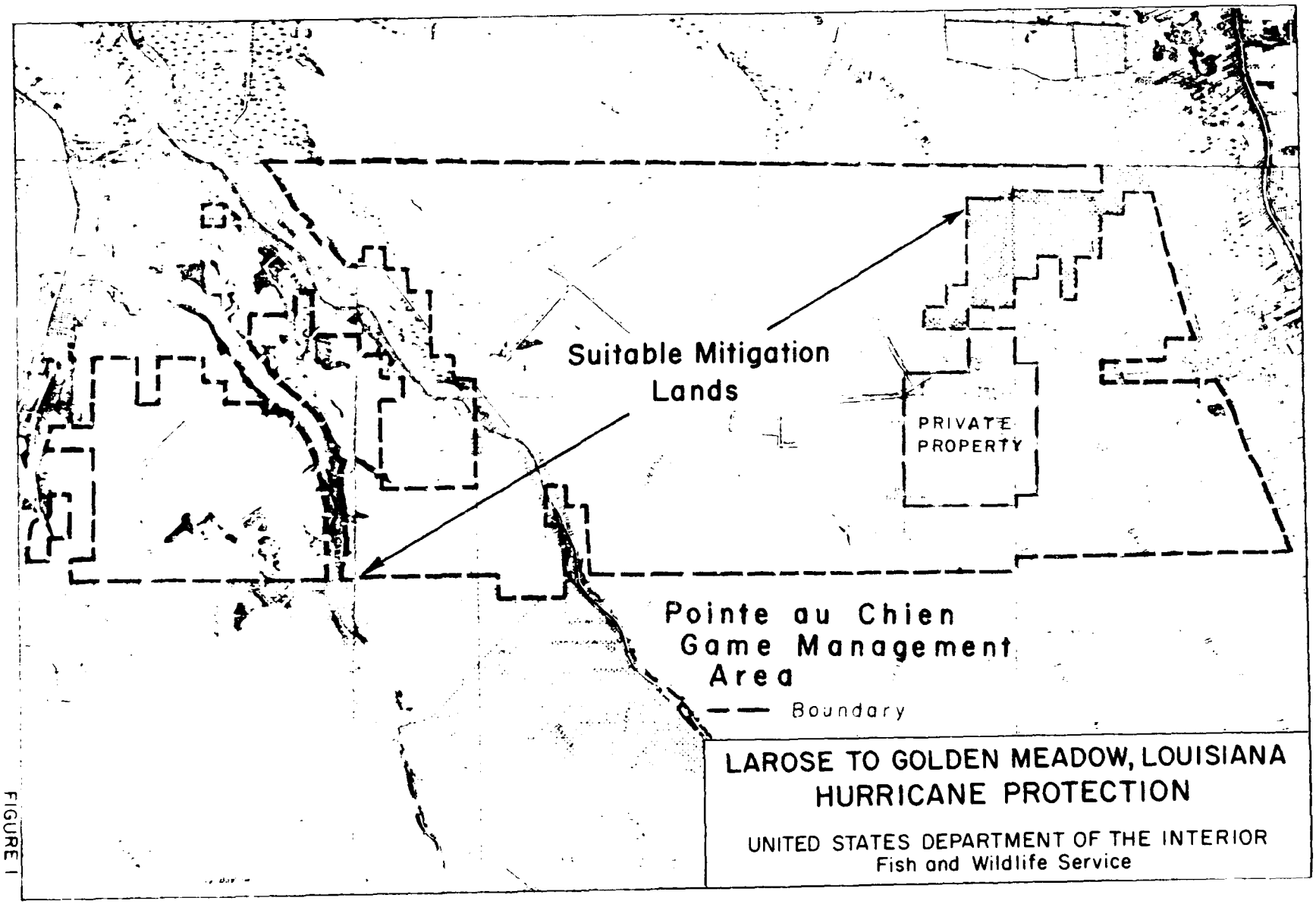
Suitable Mitigation Lands
PRIVATE PROPERTY
Pointe au Chien Game Management Area
Boundary
LAROSE TO GOLDEN MEADOW, LOUISIANA
HURRICANE PROTECTION
UNITED STATES DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service

FIGURE 1

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Duval Building
9450 Gandy Boulevard
St. Petersburg, FL 33702

December 8, 1975 FSE21/GB

Mr. Kenneth E. Black
Regional Director
Fish and Wildlife Service
17 Executive Park Drive, NE
Atlanta, GA 30329

Dear Mr. Black:

The National Marine Fisheries Service (NMFS) has received and reviewed a copy of your proposed report to the District Engineer on the Larose to Golden Meadow, Louisiana, Hurricane Protection Project in response to the District Engineer's letter referenced LMNED-DL, dated October 3, 1975.

Please refer to our letter to the District Engineer dated November 19, 1975, by which we responded to his October 3, 1975, letter on the subject project. Our comments and recommendations addressed the protection of the wetlands to be enclosed by the Belle Amie and Yankee Canal levee segments.

In the first paragraph of the Discussion Section of your proposed report you discuss project modifications consisting of the incorporation and operation of water control structures which if implemented would preserve the character of the wetlands to be enclosed by the project levee. These modifications should be clearly stated as recommendations. To clarify the degree of tidal exchange through the levee, a wording such as - should allow unrestricted tidal exchange - should replace similar wording in the last sentence on page 4 of the report.

We note that you also recommended that if the above-mentioned recommendation is not implemented, then marshlands located adjacent to the nearby Pointe-au-Chein Wildlife Management Area be purchased for the purpose of intensive fish and wildlife management. Since we are unaware of any appropriate intensive management of marine fishes to recommend and these wetlands are already protected by Federal statute (Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Federal Water Pollution Control Act Amendments of 1972), their purchase apparently would not mitigate the losses to marine fisheries habitat. Furthermore, we have recommended to the Corps they not install appropriate water exchange structures, the levee south of Yankee

Canal be realigned to be closer to Bayou Lafourche than originally proposed. Therefore, we would concur with your recommendation if the second complete sentence on page 5 of your report was replaced by the following two sentences: If this alteration in project plans is not implemented, adequate compensation for project damages to wildlife resources can only be provided by the purchase of marshlands for the purpose of intensive wildlife management. Also, the project damage to marine fisheries habitat could be reduced by realigning the levee south of Yankee Canal to be located closer to Bayou Lafourche than suggested in your letter of October 3, 1975. Following these sentences the recommended alignment should be described, or our description in our letter of November 19, 1975, to the Corps should be referenced.

The NMFS would concur in your report provided the changes recommended above are incorporated in the report.

Sincerely,

William H. Stevenson
Regional Director

State of Louisiana

WILD LIFE AND FISHERIES COMMISSION
400 ROYAL STREET
NEW ORLEANS 70130

J. BURTON ANGELLE
DIRECTOR

EDWIN EDWARDS
GOVERNOR

December 17, 1975

Mr. John D. Green
Regional Supervisor
Division of Ecological Services
U. S. Department of the Interior
Fish and Wildlife Service
17 Executive Park Drive, N. E.
Atlanta, Georgia 30329

Dear Mr. Green:

Personnel of the Louisiana Wildlife and Fisheries Commission have reviewed your proposed report on the LaRose to Golden Meadow, Louisiana, Hurricane Protection Project. We feel the report adequately describes alternatives for lessening the adverse impacts to the wildlife and fish resources in the project area.

Our agency agrees with the mitigation proposal which would enlarge the Pointe Au Chien wildlife management area and replace wetlands lost in the project. We support and agree with the modifications as outlined in the proposed report.

Thank you for the extra time allowed for reviewing and commenting on this project.

Sincerely,

J. Burton Angelle
Director

JBA:FD:tam

Appendix C

United States Department of the Interior

FISH AND WILDLIFE SERVICE

POST OFFICE BOX 4305
111 EAST MAIN STREET
LAFAYETTE, LOUISIANA 70502

August 7, 1980

District Engineer
U.S. Army Corps of Engineers
P.O. Box 60267
New Orleans, Louisiana 70160

Dear Sir:

Reference is made to your April 28, 1980, letter (LMNED-MP) regarding proposed modifications to the Larose to Golden Meadow, Louisiana, Hurricane Protection Project. According to your letter, local interests have requested that the New Orleans District Corps of Engineers (NODCE) revise the levee alinement in the area of Clovelly Farms and the land owned by Louisiana Land and Exploration Company (LL&E) near Golden Meadow. This letter is provided on a planning aid basis and does not fulfill our total responsibilities under provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

PROJECT DESCRIPTION

The Larose to Golden Meadow, Louisiana, Hurricane Protection Project was authorized in 1965 by Public Law 298, 89th Congress, 1st Session. Portions of the project have been under construction since 1975. The proposed modifications in the Clovelly Farms and LL&E areas are shown on Figure 1. The work would essentially consist of raising the existing levees which presently enclose the two referenced areas to design grade. Design grade in the Clovelly Farms area is 8.5 feet National Geodetic Vertical Datum (NGVD), while the design grade in the LL&E area will range from 11.2 feet to 13.0 feet NGVD. Departure from the existing levee alinements would be required at designated locations. The proposed levees would be constructed in three lifts, with intervals of 3 years between lifts. Borrow material would be obtained from existing canals adjacent to the present levee system and from adjacent wetlands.

FISH AND WILDLIFE RESOURCES

Clovelly Farms Area

Habitat types in the Clovelly Farms area consist of fresh to intermediate marshes (Chabreck 1972) and associated shallow ponds, existing levees and spoil banks, canals, and cultivated lands. Fresh marshes and intermediate marshes have been designated as Palustrine

Emergent Wetlands and Estuarine Emergent Wetlands, respectively, by Cowardin et al. (1979). Shallow ponds in the fresh marshes are termed Palustrine Open Water when unvegetated, and Palustrine Aquatic Bed when dominated by submergent and/or floating vegetation (Cowardin et al. 1979). Ponds in the intermediate marshes are called Estuarine Open Water or Estuarine Aquatic Bed (Cowardin et al. 1979), depending on whether or not they support extensive submergent or floating vegetation. Fresh marsh is found near the northwest corner of Clovelly Farms, while intermediate marsh borders the remainder of the alternate levee alignment. Common fresh marsh vegetation includes bulltongue, alligatorweed, cattail, and water hyacinth. Primary intermediate marsh vegetation consists of saltmeadow cordgrass, bulltongue, and bullwhip.

Existing levees and spoil banks support common reed, goldenrod, red maple, black willow, southern dewberry, and various terrestrial grasses. Canals consist of the perimeter Clovelly Farms borrow canal and those excavated for oil and gas exploration. Vegetation in these canals is sparse except for drifting mats of water hyacinth and scattered stands of Eurasian watermilfoil in the shallower waters. Cultivated lands in the area are primarily in sugarcane, with terrestrial grasses common along roads and drainage ditches.

Fishery resources in the Clovelly Farms area are primarily associated with canals and shallow marsh ponds. The canals are expected to support both freshwater and estuarine species. Common freshwater species include blue catfish, channel catfish, warmouth, black crappie, largemouth bass, threadfin shad, and alligator gar. Estuarine species believed to be found in the canals include Atlantic croaker, Gulf menhaden, bay anchovy, striped mullet, blue crab, brown shrimp, and white shrimp. The adjacent shallow marsh ponds provide feeding and nursery habitat for many of these species, especially during high tide periods. In addition, organic detritus produced by marsh vegetation is flushed into the ponds, canals, and adjacent estuarine waters where it contributes to a detritus-based food web largely responsible for the Barataria Bay estuary's high level of estuarine fish and shellfish production. According to National Marine Fisheries Service commercial fishery statistics compiled by the NODCF, the Barataria Bay estuary (Hydrologic Unit IV) accounted for an average annual estuarine-dependent fishery harvest of nearly 469 million pounds during 1963-1973, having a 1973 exvessel value of over $40 million.

The wildlife value of the fresh to intermediate marshes and associated ponds is considered high. Migratory waterfowl believed to winter in these marshes include mallard, northern pintail, blue-winged teal, green-winged teal, gadwall, American wigeon, northern shoveler, ring-necked duck, lesser scaup, and American coot. Mottled ducks are also believed to utilize these wetlands for nesting and feeding purposes. Other birds present in these wetlands include king rail, sora, common gallinule, least bittern, green heron, yellow-crowned night heron, great blue heron, Louisiana heron, common egret, cattle egret, white ibis, black-necked stilt, red-winged blackbird, and boat-tailed grackle. Game mammals present include white-tailed deer and swamp rabbit.

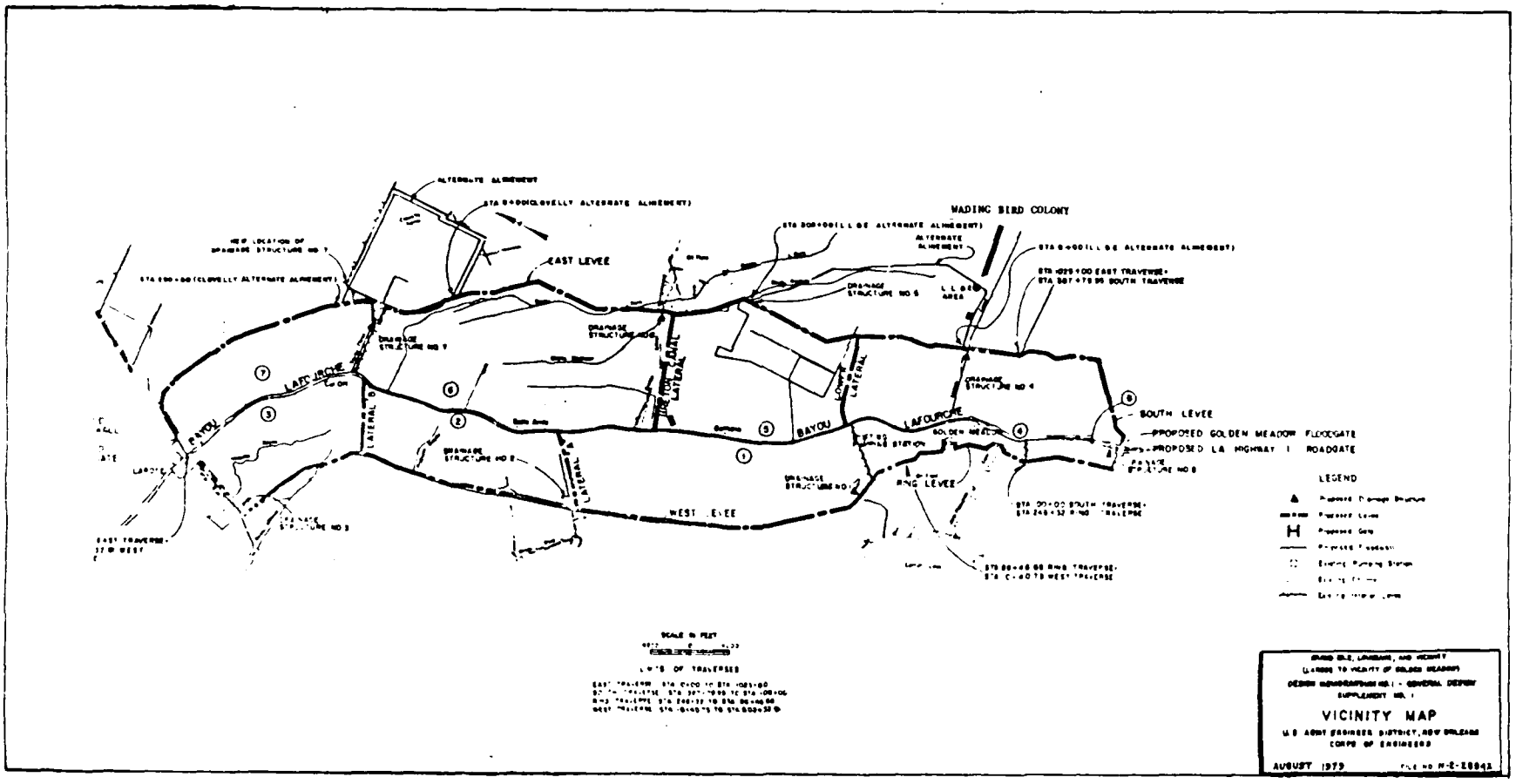
WADING BIRD COLONY
EAST LEVEE
SOUTH LEVEE
PROPOSED GOLDEN MEADOW FLOODGATE
PROPOSED LA HIGHWAY 1 ROADGATE
WEST LEVEE
RING LEVEE
BAYOU LAFOURCHE
LEGEND
VICINITY MAP
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
AUGUST 1979

PLATE 1

Commercially important furbearers found in the fresh to intermediate marshes include nutria, muskrat, raccoon, mink, and river otter. The American alligator is common in the area marshes and associated ponds and canals. This species is presently listed as "threatened" by the U.S. Department of the Interior under the Similarity of Appearance clause of the Endangered Species Act of 1973. Amphibians in the area wetlands include the bullfrog, pig frog, cricket frog, and green treefrog.

Wildlife found on the existing levees and spoil banks include numerous songbirds, mourning dove, swamp rabbit, eastern cottontail, and possibly rice rat. Limited nesting by American alligator in these habitats is expected, as is usage by fur animals during flood periods. In addition to the American alligator, the shallow nearshore waters of the existing canals are believed to support limited use by American coot, common gallinule, and various wading birds. Wildlife expected to occur in the cultivated areas include eastern cottontail, cattle egret, mourning dove, and other seed-eating birds.

LL&E Area

Habitat types in the LL&E area include intermediate to brackish marshes and associated open water, forested wetlands, crawfish ponds, existing spoil banks and levees, pasture lands, and existing borrow canals. The vegetation of these habitat types is described below.

The marshes in the LL&E area are located outside of the existing forced drainage system serving the LL&E Farms area. Common intermediate marsh vegetation includes dwarf spikerush, coast bacopa, and saltmeadow cordgrass. The brackish marsh in the project area supports saltgrass, saltmeadow cordgrass, and saltmarsh cordgrass. Some areas of estuarine open water within the marsh support extensive stands of widgeongrass. Forested wetlands (Palustrine Forested Wetlands; Cowardin et al. 1979) along Bayou Raphael include wooded swamp and natural levee forest. Wooded swamp is present in areas experiencing prolonged flooding, and is characterized by tree species such as baldcypress and swamp red maple. Natural levee forest is less frequently flooded, and is found on the higher portions of the Bayou Raphael ridge. Overstory vegetation in this cover type includes hackberry, sweetgum, American elm, green ash, red maple, Nuttall oak, water oak, and live oak. Understory species include pokeweed, greenbriar, rattan vine, palmetto, and herbaceous groundcover.

Approximately 500 acres of crawfish ponds are present within the LL&E area. These ponds provide seasonal wetland habitat supporting plant species such as alligatorweed, cattail, and annual grasses and sedges.

Existing spoil banks and levees support common reed, terrestrial grasses, seaside goldenrod, giant ragweed, elderberry, southern dewberry, Eastern baccharis, marsh elder, verbena, and chinaberry. Pasture lands support a variety of native herbaceous vegetation, with scattered areas supporting wetland plants such as cattail, pickerelweed, and smartweed. The borrow canals, located outside

the existing LL&E levee, are generally unvegetated.

Fishery resources in the LL&E area are primarily estuarine-dependent. The intermediate to brackish marshes (Estuarine Emergent wetlands; Cowardin et al. 1979) and associated shallow waters (Estuarine Open Water, Estuarine Aquatic Bed; Cowardin et al. 1979) found in the area constitute important nursery habitat for species such as Gulf menhaden, Atlantic croaker, sand seatrout, red drum, southern flounder, striped mullet, blue crab, white shrimp, and brown shrimp. The decaying vegetation flushed from the marshes and vegetated shallows also serves as a source of organic detritus for adjacent estuarine waters, contributing to fish and shellfish productivity. Limited fish populations are found in Bayou Raphael, and are believed to be dominated by species tolerant of low oxygen conditions. These include gars, bowfin, mosquitofish, and killifishes.

The intermediate to brackish marshes of the LL&E area support a variety of wildlife. These wetlands provide important feeding and resting habitat to migratory waterfowl including mallard, blue-winged teal, green-winged teal, gadwall, American wigeon, Northern pintail, Northern shoveler, lesser scaup, and American coot. Mottled ducks are believed to nest in the area. These marshes also provide nesting habitat to common gallinule, clapper rail, and king rail, and serve as important feeding areas to numerous species of wading birds such as Louisiana heron, yellow-crowned night heron, little blue heron, snowy egret, cattle egret, great egret, and white ibis. A large active wading bird nesting colony is located in a grove of Chinese tallow trees lying within the proposed LL&E levee right-of-way near Centerline Station 63+37.25. The general location of this colony is shown on Figure 1. A detailed population estimate of that colony was made during a survey conducted for the U.S. Fish and Wildlife Service in 1976 (Portnoy 1977). That survey revealed the following numbers of nesting adults: cattle egret (2,400); great egret (100); little blue heron (250); and white ibis (30). This colony was briefly inspected by a Fish and Wildlife Service biologist on July 16, 1980. This inspection revealed that the colony was still quite active, with all of the species observed in 1976 still present. Also noted was a large number of Louisiana heron adults and young. A detailed census of population numbers was not possible, due primarily to adverse weather conditions.

Commercially important furbearers expected to be common in the project area marshes include muskrat, river otter, nutria, raccoon, and mink. Other mammals present include swamp rabbit and possibly white-tailed deer. The American alligator is abundant in the canals and adjacent marshes.

The forested wetlands of the Bayou Raphael ridge are heavily grazed by cattle and partially from ranging hogs. Consequently, their value to white-tailed deer has been substantially reduced. Limited numbers of gray squirrels and fox squirrels are expected to be present. American woodcock and mourning dove are also expected to be associated with these woodlands. Habitat is also provided for a variety of non-

game birds such as warblers, cardinal, blue jay, Carolina wren, woodpeckers, common crow, fish crow, vultures, wading birds, hawks, and owls. Other non-game wildlife include numerous species of frogs, snakes, toads, lizards, turtles, and salamanders.

The crawfish ponds within the LL&E levee provide seasonal wetland habitat believed to be utilized extensively by wading birds, shorebirds, and migratory and resident waterfowl. The annual dewatering during the summer months enhances the production of annual grasses and sedges valuable to waterfowl as food.

The wildlife use of existing levees and spoil banks is similar to that described above for the Clovelly Farms area. Leveed pasture within the LL&E forced drainage system supports seed-eating and insectivorous birds such as mourning dove, common snipe, eastern meadowlark, and cattle egret. The Eastern cottontail and swamp rabbit are believed to be the only game mammals present in these areas. Other mammals expected to occur include nine-banded armadillo, rice rat, and opossum.

IMPACT EVALUATION

The proposed alinement changes will have both direct and indirect adverse impacts on fish and wildlife resources. Direct impacts are primarily associated with levee construction and associated borrow material excavation in wetlands. The most serious indirect impacts will occur with inclusion of additional wetland areas in the hurricane levee system and subsequent elimination of these habitats by forced drainage. The impacts of the two alternative alinements are discussed below.

Clovelly Farms

Table 1 shows a comparison of the estimated wetland losses associated with the General Design Memorandum (GDM) alinement and the proposed Clovelly Farms Alternative.

As noted in Table 1, the Clovelly Farms Alternative will increase total marsh losses by 6 [illegible].2 acres compared to the GDM Plan. The fishery value of the wetlands lost to levee construction or subsequently eliminated by inclusion in forced drainage systems will be totally eliminated. In addition, conversion of marsh to borrow canals is expected to reduce the value of the affected area to freshwater and estuarine-dependent finfish and shellfishes. This is attributed to a reduction in the amount of detritus produced and reduced shallow water nursery habitat. A recent study of the nekton of the upper Barataria Basin (Chambers 1980) revealed greater standing crops of fishes in shallow marsh [illegible] than those in ditches and open water areas.

Similar adverse impacts on wildlife populations will also occur with the Clovelly Farms Alternative. Marsh and shallow water areas converted to levee will be of little value to wildlife. Frequent mowing of the levee is anticipated, thus rendering it of low value even

Table 1. Comparison of Wetland Impacts Associated with Clovelly Farms Alter
GDM Alinement, Larose to Golden Meadow, Louisiana, Hurricane Prote

Plan	Fresh-Intermediate Marsh Acres Within Right-of-Way	Additional Fresh-Intermediate Marsh Acreage Enclosed	Total Fre mediate M Acreage A
Clovelly Farms Alternative	87.2	56.9[a]	144.
GDM Alinement	74.9[b]	N/A[c]	74.
Net Increase in Fresh-Intermediate Marsh Acreage Lost With Clovelly Farms Alternative	12.3	56.9	69.

a. Represents 76.3 acres of marsh endorsed by Clovelly Farms Alternative mi estimated 19.4 acres of marsh that would be eliminated by GDM levee in t reach.

b. Based on estimated length of 14,500 feet and average right-of-way width through marsh of 225 feet.

c. Only the increased acreage of enclosed wetlands associated with the Clov Farms Alternative is treated in this table.

to terrestrial wildlife. Elimination of marsh by inclusion in forced drainage systems will also severely reduce its value to most wildlife species, as will conversion of marsh to borrow canal.

LL&E Area

Damages to fish and wildlife resources with the LL&E Alternative Alinement are primarily associated with elimination of intermediate to brackish marsh and associated shallow waters, and of forested wetlands (wooded swamp and natural levee forest) found along Bayou Raphael. Table 2 summarizes net losses of these habitats that would occur with implementation of the LL&E Alternative Alinement. As the GDM levee alinement in this area would traverse lands dominated by pasture, no significant losses of wetlands are anticipated with that plan.

As with the Clovelly Farms Alternative, the fishery value of the wetlands lost to levee construction will be totally eliminated, and the area converted from marsh to borrow area substantially reduced. The contribution of organic detritus by the intermediate to brackish marsh in the project area will be lost.

The value of the project area marshes and shallow ponds as feeding habitat for waterfowl, wading birds, shorebirds, and fur animals will be virtually eliminated by levee construction. Some use of the enlarged borrow canals by American alligators is anticipated.

The conversion of forested wetlands to levee and borrow canal will virtually eliminate the value of this habitat to forest-associated wildlife such as white-tailed deer, fox squirrel, gray squirrel, and woodland songbirds. Wildlife use of the resultant borrow pit excavated in forested wetlands is expected to be limited primarily to shoreline areas, primarily by American alligator, wading birds, and possibly a few resident wood ducks and migratory waterfowl. Wildlife useage of the levee will be minimal.

Moderate freshwater fish populations can be expected to develop in the borrow pits located in forested wetlands. The value of these areas as fish habitat will depend on such factors as the degree of flooding of contiguous forested wetlands, the amount of agricultural runoff entering these pits, and water depth. Based on the inclusion of adjacent forested wetlands in the forced drainage system that will serve the leveed area, it is unlikely that flooding of these wetlands will allow use by fish populations for spawning and nursery purposes. In addition, the borrow canals will serve as catchment basins for nutrient-enriched runoff from the LL&E farms area. Such nutrient enrichment may lead to periodic oxygen depletion and resultant fish kills. The likelihood of such events will be increased if the depth of the borrow pits exceeds 6 to 8 feet and thus allows for development of an anoxic stratum (hypolimnion).

Levee construction in areas of existing crawfish ponds will reduce seasonal habitat for migratory waterfowl, wading birds, and shorebirds. Construction on existing levees and spoil banks is expected to reduce

Table 2. Wetlands Losses Attributable to LL&E Alternative Alinement[a]

Habitat Type	Acreage Within Right-of-Way
Intermediate to Brackish Marsh and Associated Shallow Water	118.0
Forested Wetlands Inside Existing LL&E Levee	17.9
Forested Wetlands North of LL&E Levee	96.2
Total Wetland Acreage	232.1

a. Excludes seasonal wetlands created by flooding of LL&E of lands for crawfish production.

habitat for wildlife presently using such areas, as cover will be reduced by more frequent mowing.

Of particular concern is the proposed levee construction within a portion of the existing wading bird nesting colony near Centerline Station 63+37.25 of the LL&E Alternative Alinement. Such construction would eliminate a portion of the nesting cover in this colony, and could lead to complete abandonment of the colony by nesting wading birds. Additionally, there is no assurance that suitable alternative nesting cover would be available to permit relocation of this colony.

DISCUSSION AND RECOMMENDATIONS

As indicated above, the proposed Clovelly Farms and LL&E alternatives will substantially increase wetland impacts, as compared to the GDM alinement.

Most of the wetland damages associated with the Clovelly Farms Alternative would be eliminated if borrow material was obtained from the existing borrow canal and/or upland sources only, and the enclosure of the 76.3-acre triangle of marsh along the northwest-corner of Clovelly Farms was deleted from project plans.

Measures could also be taken to greatly reduce adverse impacts to fish and wildlife habitat associated with the LL&E Alternative. The loss of approximately 118 acres of intermediate to brackish marsh and associated open water could be greatly reduced by elimination of borrow material excavation in these habitats. Borrow material could be obtained from the existing borrow canals adjacent to the LL&E levee and from nearby drained lands. It is possible that the borrow pits created on the protected side of the LL&E levee could serve as a supplemental source of fresh water for the LL&E crawfish ponds. Water for flooding of those ponds is presently obtained from interior canals in that area.

Damages to forested wetlands along Bayou Raphael could be substantially reduced by realinement of the portion of the levee and borrow pits located north of Centerline Station 224+00 to the drained area just west of Bayou Raphael. This would require moving the levee centerline approximately 500 to 800 feet west of its present alinement between Centerline Stations 224+00 and 339+13.11.

Adverse impacts to the wading bird rooker, in the southern portion of the LL&E area could be minimized by:

1) Realining of the levee to avoid destruction of nesting cover; and

2) Scheduling of construction to minimize disturbance during the nesting season.

In view of the foregoing, we would not oppose the proposed levee revisions if the [illegible] modifications were incorporated into

the final plans:

1. In the Clovelly Farms area:

   a. all borrow material shall be obtained from upland sources or from existing borrow canals; and

   b. the enclosure of the triangle of marsh near the northwest corner of Clovelly Farms shall be deleted from project plans.

2. In the LL&E area:

   a. no borrow material shall be removed from intermediate marsh, brackish marsh, or forested wetlands;

   b. the proposed levee segment located north of Centerline Station 224+00 shall be moved 500 to 800 feet west of its present alinement to avoid destruction of forested wetlands along the Bayou Raphael ridge;

   c. the proposed levee segment located between Baseline Stations 66+63 and 77+38 shall be realined approximately 170 feet to the east to avoid impacts on nesting cover at the wading bird nesting colony located in that segment; and

   d. construction activity shall be prohibited between Baseline Stations 29+00 and 99+00 during the period of February 15 to August 15 of each year in order to minimize disturbance of the referenced wading bird rookery.

ADDITIONAL CONSIDERATIONS

Habitat maps of appropriate portions of the Mississippi Deltaic Plain Region prepared for the U.S. Bureau of Land Management (BLM) and the U.S. Fish and Wildlife Service (FWS) were utilized during our recent field inspection of the proposed levee realignment sections. These maps were prepared at a scale of 1:24,000 from color-infrared aerial photographs taken in 1978. Copies have been recently provided to your Planning Division. The habitat maps revealed that an acreage of wetlands far in excess of that originally documented in Corps of Engineers or Fish and Wildlife Service reports will be lost with construction of levee segments D, E, and F with the GDM alinement. Prior estimates of wetland losses have included only the Yankee Canal area (Section A East) and the Belle Amie area (Section C), involving a total of approximately 2,750 acres. However, preliminary estimates developed from the new BLM-FWS habitat maps and subsequent ground truthing indicate that an additional 1,195 acres of fresh to intermediate marsh and 590 acres of forested wetlands (natural levee forest and wooded swamp) will be destroyed or included in forced drainage systems with the GDM alignment in Sections D, E, and F alone.

Because of these findings, it is our opinion that the mitigation plan currently being developed for the unavoidable wetland losses associated with this project should be revised. This revision would include mitigation of all wetland losses, and not just the 2,750 acres referenced in the Supplemental Statement of Findings submitted by the NODCE on November 2, 1976, to the Environmental Protection Agency as required by Section 404 of the Federal Water Pollution Control Act Amendments of 1972. The Fish and Wildlife Service's Habitat Evaluation Procedures would be utilized to quantify non-monetary habitat losses and to assist in the evaluation of a mitigation plan. We also believe that a supplemental document should be prepared by the Corps of Engineers fully detailing all wetland types and acres to be affected by the entire project. This would include wetlands directly lost to construction, and wetlands enclosed by hurricane levees and subsequently eliminated by forced drainage systems. The proper vehicle for such an assessment might include the upcoming mitigation report or a supplement to the Environmental Impact Statement.

With regard to the mitigation issue, we are concerned that the unfavorable response to date by local interests to cost sharing for mitigation measures may prevent implementation of an adequate mitigation plan. If this is the case, efforts should be re-directed to include structural revisions on the project that will prevent losses of valuable wetland fish and wildlife habitat. Such measures could include substitution of floodgates for pumping stations in areas containing large wetland acreages. Such floodgates would remain open at all times except during periods immediately preceding and during extreme tidal flooding associated with tropical storms or hurricanes. This would allow the enclosed wetlands to remain in a natural state. It would also be consistent with prior Corps of Engineers and Environmental Protection Agency action on the Harvey Canal-Bayou Barataria, Louisiana, project, where floodgates were substituted for a pumping station to preserve approximately 2,700 acres of coastal wetlands. Another approach would be to realign levees to the wetland-nonwetland interface and obtain borrow material for levee construction from non-wetland sites. Because the Corps of Engineers is presently considering alinement changes recommended by local interests, alternative alinements and structural measures to reduce wetland losses should also be re-evaluated. Such action would be consistent with Executive Order 11988 (Floodplain Management) and Executive Order 11990 (Protection of Wetlands). The objective of Executive Order 11988 is to "...avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative...". Executive Order 11990 was issued to "...avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid the direct or indirect support of new construction in wetlands wherever there is a practicable alternative...".

It is requested that we be advised of your final decision as to whether the alternative levee alignments requested by local interests will be incorporated into the project. In addition, your views on further consideration of project modifications to reduce wetland losses, as well as your plans to re-assess these losses, will also be appreciated.

Copies of this report have been provided to the Louisiana Department of Wildlife and Fisheries and the National Marine Fisheries Service for their review. Copies of any comments received from those agencies will be forwarded to you.

Please advise if we can be of further assistance in this matter.

Sincerely yours,

Cary W. Kerlin

Cary W. Kerlin
Field Supervisor

cc: EPA, Dallas, Texas
NMFS, Galveston, Texas
La. Dept. of Wildlife and Fisheries, New Orleans, La.
La. Dept. of Wildlife and Fisheries, Baton Rouge, La.
Area Office, FWS, Jackson, Mississippi

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Appendix D

United States Department of the In...

March 26, 1982

District Engineer
U.S. Army Corps of Engineers
P.O. Box 60267
New Orleans, Louisiana 70160

Dear Sir:

Reference is made to the authorized Larose to Golden Meadow, Louisiana, Hurricane Protection Project. The Fish and Wildlife Service (FWS) is working with members of your staff in the development of a mitigation plan and supplement to the environmental impact statement (EIS) for that project. The results of the FWS's Habitat Evaluation Procedures (HEP), as transmitted to you in this report, provide a quantitative, non-monetary evaluation of the project impacts to fish and wildlife resources, an evaluation that is essential to the development of an acceptable mitigation plan. These comments are submitted on a planning aid basis and do not fulfill our total responsibilities under provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

PROJECT DESCRIPTION

The Larose to Golden Meadow, Louisiana, Hurricane Protection Project was authorized by Public Law 89-298, 89th Congress, in 1965. The project area extends along both sides of Bayou Lafourche from Larose to a point about 2 miles south of Golden Meadow, in southern Lafourche Parish, Louisiana (Plate I). The project, as described in the General Design Memorandum (GDM) and in the Final EIS prepared by your District Office in 1973, involved the enlargement or construction of about 43 miles of perimeter levees and the construction of two navigable flood control structures to protect the project area from hurricane floods. Completion of this action was originally expected to destroy about 2,750 acres of productive wetlands.

Project modifications, updated wetland maps, and more accurate acreage measurements have led to significant changes in prior assessments of project impacts to fish and wildlife. As indicated in our August 7, 1980, letter report on this project, a large wetland area has been identified, within and adjacent to the Section E portion of the GDM alignment, in addition to that acreage originally identified as wetland.

The additional area to be destroyed by levee construction or to be included in the forced drainage system via the levee construction includes 1,098 acres 1/ of fresh/intermediate marsh and open water and 585 acres of forested wetlands (natural levee forest and wooded swamps). Conversely, a modification in the Yankee Canal portion (Section A East) of the original GDM alignment has significantly reduced the wetland loss anticipated with this project feature. However, the modified GDM alignment is, based on the recent analysis conducted by our staff and members of your Environmental Section, expected to destroy 4,025 acres of valuable marsh, forested wetlands, and shallow water bodies.

Two levee alignments that were originally considered as possible alternatives but are now being included as part of the Tentatively Selected Plan (TSP) are additions to the modified GDM alignment. One alignment would enclose the Louisiana Land and Exploration (LL&E) farm near Golden Meadow and the other would enclose Clovelly Farms near Cut Off. Both of these areas have existing, privately built levees that provide sufficient flood protection from normal storm surges but, reportedly, will not provide sufficient protection from hurricane floods. Significant construction will, therefore, be necessary to improve these levees to the desired grade. Completion of the LL&E levee alignment is expected to destroy an additional 218 acres of brackish/saline marsh, open water, and forested habitat. Completion of the proposed Clovelly Farms levee alignment is expected to destroy an additional 105 acres of fresh/intermediate marsh, open water, and forested habitat.

Implementation of the TSP, which includes the modified GDM alignment and the two new levee alignments, would cause the destruction of about 4,348 acres of fresh/intermediate and brackish/saline marsh, open water, and forested habitats. These losses are presented by habitat type in Table 1.

1/ All estimates of existing habitat acreages in the "Project Description" section of this report were made using 1978 habitat maps. As discussed in the "Methods" section, subsidence, saltwater intrusion, and other factors are causing habitat acreage changes in the project area. Therefore, estimates of future habitat acreages were based on 1978 acreages and projected rates of change from 1975 to 2096; these figures are presented in other sections of this report.

Table 1. Expected acreage losses, by habitat type, associated with completion of the Larose to Golden Meadow, Louisiana, Hurricane Protection Levee.

Habitat type	Acres to be impacted 1/			
	GDM alignment	LL&E alignment	Clovelly Farms alignment	Tentatively Selected Plan
Fresh/intermediate marsh	282/605	0/0	44/51	326/656
Brackish/saline marsh	244/570	46/0	0/0	290/570
Open water	319/1181	42/0	8/2	369/1183
Forested	143/681	100/30	0/0	243/711
Total	988/3037	188/30	52/53	1228/3120

1/. Area destroyed by the project is listed as acres lost to levee construction/ acres enclosed by the levee as determined from 1978 habitat maps.

METHODS

The Service's HEP was developed to be used to document the quality and quantity of available habitat for fish and/or wildlife species. Using HEP, habitat quality and quantity can be established for baseline conconditions and predicted for future with- and without-project habitat conditions. This standardized methodology allows a numeric comparison of each future condition and hence provides an estimate of project-induced impacts on fish and wildlife resources.

Because the initial field portion of the HEP was completed in 1979, the 1976 version of the HEP analysis has been used in lieu of the updated 1980 version. In implementing the HEP analysis, habitat types within the project area were identified and a list of species that are economically important and/or represent various trophic levels of wildlife utilizing these habitat types were selected as evaluation elements. The four habitat types identified in the project area were fresh/intermediate marsh, brackish/saline marsh, open water, and forested. According to the classification of Cowardin et al. (1979), fresh marsh is defined as palustrine emergent wetland; intermediate, brackish, and saline marsh are termed estuarine emergent wetlands; and shallow open waters are termed palustrine open waters where salinity is less than 0.5 parts per thousand (ppt) and estuarine open water where salinities average more than 0.5 ppt. Under that same classification system, forested wetlands are broadly categorized as palustrine forested wetlands. Evaluation elements selected for the marsh and open water habitats were American alligator; puddle ducks; herons, egrets, and ibises; boat-tailed grackle; rails; North American mink; Neartic river otter; swamp rabbit; muskrat; and northern raccoon. For forested habitats the boat-tailed grackle and rails were dropped as evaluation elements and replaced by white-tailed deer and squirrels.

A number of randomly-selected points within each of these habitat types were chosen as sample sites. A team of biologists representing the Corps of Engineers, the Louisiana Department of Wildlife and Fisheries, and the FWS visited a total of 18 randomly-selected sites during October 23 and 24, 1979, and November 17 and 18, 1981 (Plate 1). At each site, the team rated the habitat suitability of each evaluation element on a scale of 0 to 10, with 0 being the poorest and 10 being the optimal score.

The average score for all evaluation elements over all sample sites within a particular habitat type is termed the habitat unit value (HUV). In those cases in which the HUV of each habitat type is based on the same set of evaluation elements, the HUV is assumed to be equivalent (i.e. HUV's can be compared among those habitat types). However, in cases in which the evaluation elements for two or more habitat types are different, it is necessary to convert all HUV's to an equivalent scale. This is accomplished by calculating a relative importance value (RIV)

for each habitat type based on its resource value, scarcity, vulnerability, and recreational value in comparison to the other habitat types in the study area. When RIV's are determined, the HUV for a particular habitat type is multiplied by the appropriate RIV to establish a comparable (equivalent) HUV for that habitat type.

The habitat unit (HU) is the basic unit utilized in the HEP for measuring project effects on wildlife. HU's are the product of the HUV and acreage of a particular habitat type at a given point in time (target year). Target years are set to depict significant changes in habitat quality or quantity that are expected to occur during the life of the project. HU's are established for baseline conditions using data collected by the team of biologists and actual measurements of existing habitat acreages. Future HU's change according to habitat changes in quality or quantity that are expected to occur at various target years during the life of the project, either without the project or with the project.

For this project, target years selected constitute significant points in project construction. The target years selected were 1985, beginning of construction; 1986, end of the first levee lift; 1991, 5-years after completion of the first lift (all of the enclosed area under pumped drainage); 1996, end of construction; 2006, 10-years after project completion; 2021, 25-years after project completion; 2046, 50-years after project completion, and 2096, 100-years after project completion (end of project life). As a result of many factors, of which subsidence and saltwater intrusion are the most significant, habitats in the project area are changing at a rapid rate. Accordingly, acreages at each target year were adjusted using habitat changes estimated from data generated by FWS personnel at the National Coastal Ecosystems Team in Slidell, Louisiana. The adjusted habitat acreages for each target year under future without-project (FWOP) conditions and future with-project (FWP) conditions for the TSP are presented in Table 2.

Descriptions of existing habitats in the project area have been provided in previous letter reports dated July 3, 1975 and August 7, 1980. Three habitats (i.e. levee, pasture, and developed) have not been previously described but would be created through implementation of the project. The levee that is to be constructed will be built in a series of "lifts". During each lift, spoil will be placed in the levee right-of-way, allowed to dry, shaped, and mowed. Once all lifts are completed, the levees will be mowed and/or grazed, and perennial grasses maintained as the dominant vegetation. It was determined that these areas would be of little or no value to the evaluation elements and were [illegible]. The areas enclosed by the levee [illegible] drainage system and are [illegible] determined that the habitat quality of the enclosed areas [illegible] evaluation elements would [illegible] the HUV of the enclosed [illegible] will become [illegible] 1991).

...rison of future without-project (FWOP) and future with-project (FWP) habitat acreage for the Tentatively Selected Plan.

Target year		Habitat types (acres)							
		Fresh/intermediate marsh	Brackish/saline marsh	Open water	Forested	Levee	Pasture	Developed	Total
1975	FWOP	1,083	836	1,475	998	0	0	0	4,392
	FWP	1,083	836	1,475	998	0	0	0	4,392
1986	FWOP	756	896	1,742	846	0	128	24	4,392
	FWP	723	554	1,124	744	1,247	0	0	4,392
1991	FWOP	642	902	1,850	785	0	179	34	4,392
	FWP	0	0	0	744	1,247	2,401	0	4,392
1996	FWOP	545	898	1,951	728	0	227	43	4,392
	FWP	0	0	0	744	1,247	2,401	0	4,392
2006	FWOP	393	866	2,135	626	0	313	58	4,391
	FWP	0	0	0	744	1,247	2,401	0	4,392
2021	FWOP	240	787	2,368	500	0	419	78	4,392
	FWP	0	0	0	744	1,247	2,401	0	4,392
2046	FWOP	107	625	2,662	344	0	550	104	4,392
	FWP	0	0	0	744	1,247	2,401	0	4,392
2096	FWOP	21	349	3,023	162	0	702	134	4,391
	FWP	0	0	0	744	1,247	2,401	0	4,392
Annualized	FWOP	277	676	2,441	466	0	447	84	4,391

The enclosed forested areas would also be drained and grazed by cattle, but not likely cleared. Because the baseline HUV of forested habitat was largely dependent upon the surrounding marsh, which will be leveed, pumped dry and grazed under future FWP conditions, the HUV of forested habitat was projected to decrease from 32.1 to 10.7 within 5-years after completion of the first lift (1991). The developed habitat type is indicative of those areas devoted to residential, commercial, or industrial development. Development under FWOP conditions is expected to occur along forested ridges; whereas, under FWP conditions development is expected to occur along existing agricultural areas which provide easy access to roads and Bayou Lafourche. Like levees, the developed areas were given an HUV of "0".

For each project feature, the change in HU's during the project life is annualized, or expressed on an average annual basis. The annualized change (increase or decrease) in HU's under FWP conditions, compared to FWOP conditions, provides a quantitative comparison of project impacts, which are expected to result from each project feature. An increase in HU's indicates that the project is beneficial to wildlife; a decrease in HU's indicates that the project is damaging to wildlife. If HU's are projected to be lost, steps must be taken to reduce and/or replace those HU's. Compensation for unavoidable project damages can, in this case, be accomplished through several vehicles, such as project modification, preservation of habitat that would otherwise be lost, and/or the addition of HU's through habitat improvement(s) that benefit the species used as evaluation elements.

RESULTS

The average HUV for each habitat type under FWOP and FWP conditions is listed in Table 3. It was decided that the HUV for each habitat type would remain the same throughout the project life. Because the HUV's for all marsh types and open water were based on the same set of evaluation elements, these HUV's were assumed to be equivalent. Only 2 of the 10 evaluation elements used for marsh and open water habitats were changed for the forested habitat, and both marsh and forested habitats had identical RIV's of 1.0. Therefore, all habitat types in the project area were considered to have equivalent HUV's.

For determining impacts associated with the TSP, the adjusted habitat acreages in Table 2 were multiplied by the HUV values in Table 3 to determine HU's for each of the target years for the FWOP (presented in Table 4). The project-related habitat losses in Table 2 were used similarly to establish changes in HU's for FWP (presented in Table 4). As illustrated in Table 4, when FWOP conditions are compared to FWP conditions, there is a total net annualized loss of 89,413 HU's with implementation of the TSP.

Table 3. Habitat unit values (HUV's) for baseline, future without-project (FWOP), and future with-project conditions (FWP).

	HUV's		
		FWP	
Habitat type	Baseline/FWOP	Row 1/	enclosed 2/
Fresh/intermediate marsh	60.25	0.00	7.50
Brackish/saline marsh	48.00	0.00	7.50
Open water	25.00	0.00	7.50
Forested	32.10	0.00	10.70
Levee	0.00	0.00	0.00
Developed	0.00	0.00	0.00

1/ Row includes areas in the levee right of way.

2/ Includes those areas protected by the levee system and expected to be included in a forced drainage system.

Table 4. Comparison of future without-project (FWOP) and future with-project (FWP) habitat units for the Tentatively Selected Plan.

Target year		Habitat units by habitat type 1/				
		Fresh/inter-mediate marsh	Brackish saline marsh	Open water	Forested	Pasture
1975	FWOP	65,251	40,128	36,875	32,036	0
	FWP	65,251	40,128	36,875	32,036	0
1986	FWOP	45,549	43,008	43,550	27,157	960
	FWP	43,561	26,592	28,100	23,882	0
1991	FWOP	38,680	43,296	46,250	25,198	1,342
	FWP	0	0	0	7,961	18,008
1996	FWOP	32,836	43,104	48,775	23,369	1,702
	FWP	0	0	0	7,961	18,008
2006	FWOP	23,678	41,568	53,375	20,095	2,348
	FWP	0	0	0	7,961	18,008
2021	FWOP	14,460	37,776	59,200	16,050	3,142
	FWP	0	0	0	7,961	18,008
2046	FWOP	6,447	30,000	66,550	11,042	4,125
	FWP	0	0	0	7,961	18,008
2096	FWOP	1,265	16,752	75,575	5,200	5,265
	FWP	0	0	0	7,961	18,008
Annualized	FWOP	16,707	32,425	61,029	14,967	3,353
	FWP	5,846	3,582	3,534	10,107	15,999
	Net change	-10,861	-28,843	-57,495	-4,860	+12,646

1/ Because levee and developed habitat types have an HUV of "0", no comparison of HU's was made under future conditions either without or with the project.

The tremendous HU loss associated with the project is a result of the annualized loss of 180 acres of fresh/intermediate marsh, 601 acres of brackish/saline marsh, 2,300 acres of open water, and a significant reduction in the wildlife value of the forested habitat in the project area (Table 2). Although there is a gain in forested habitat quantity under FWP conditions it must be remembered that the HUV drops from 32.1 to 10.7 and that there is an actual loss of nearly 5,000 HU's of forested habitat.

DISCUSSION

The HEP analysis indicates that completion of the TSP, including the modified GDM, LL&E, and Clovelly Farms alignments, would cause the annualized loss of nearly 2,800 acres of valuable fish and wildlife habitat and nearly 90,000 HU's. Most of this loss is the result of enclosing several large areas of marsh, namely Belle Amie (Section C), Yankee Canal (Section A east), and the somewhat recently identified marsh adjacent to Section E south. Enclosure of wetland areas and the expected conversion of marsh to habitats of greatly reduced wildlife value account for a large proportion of the adverse impacts associated with this project.

The FWS has been working with the Corps of Engineers on the Larose to Golden Meadow, Louisiana, Hurricane Protection Project for a number of years. In letter reports dated July 3, 1975, January 9, 1976, and August 7, 1980, the Service described fish and wildlife resources in the project area, quantified project effects on these resources, and recommended methods to reduce these impacts. Similar recommendations have also been made at a number of meetings attended by members of our respective staffs. More specifically, these recommendations have included:

1) levee realignment in the Belle Amie (Section C), Yankee Canal (Section A east), and Section E south portions of the project in an effort to reduce the amount of marsh enclosed by the levee system;

2) removal of borrow material from the area to be enclosed rather than from the flooded side of the proposed levee system in an effort to reduce habitat losses due to construction; and

3) installation of water control structures that would remain open during normal water periods to allow for tidal exchange through the levee system (thereby preserving the integrity of the marsh), but that would be closed during the threat of a hurricane.

These recommendations were intended to allow protection of existing residential and commercial developments, to allow additional development

of non-wetlands where feasible, and to preserve the character of existing wetlands. Some of these recommendations (i.e. modification of the Section A east levee alignment and removal of some borrow material from the enclosed side of the levee) were accepted and will certainly reduce project-related habitat losses. Nevertheless, far more could be done to further reduce project impacts and minimize fish and wildlife habitat losses, but still provide the same degree of protection to developed areas. Accordingly, FWS requests that the Corps adopt and implement these recommendations in their entirety. Should the Corps elect not to expand implementation of these recommendations, we request that the 89,413 HU's to be lost with construction of the TSP be replaced. This could be accomplished through either preservation of marsh habitat that would otherwise be lost without the project, management of existing publicly-owned marsh to increase its value to fish and wildlife, or a combination of these techniques. The FWS further requests that no additional project construction take place until a mitigation plan is developed and accepted by all involved federal and local agencies and, further, that implementation of mitigation features occur simultaneously with construction of other project features.

In the past, Corps of Engineers and FWS personnel have examined several alternative mitigative measures. The most promising of these involved the closure of gaps in specific spoil banks and the release of fresh water into the rapidly degrading marshes of the nearby, state-owned Pointe au Chien Wildlife Management Area. The Louisiana Department of Wildlife and Fisheries has indicated strong interest in these measures. Another mitigative measure discussed more recently is the preservation and management of the fresh/intermediate marsh immediately west of and adjacent to the Section E south levee segment (Plate 1). Preliminary estimates show that preservation of this marsh, via the purchase of real estate easements that prevent development and the installation of flap gates that allow for minimal water management, would totally mitigate for project losses to fish and wildlife. Providing public access to this area would also be strongly recommended to help offset recreational losses, associated with habitat losses, that are also anticipated with implementation of this project.

FWS personnel are looking forward to working with Corps personnel toward the development of an acceptable mitigation plan. The Louisiana Department of Wildlife and Fisheries has reviewed this report and a copy of their letter of concurrence is attached. Should you have any questions regarding this report, please contact Robert Strader of this office.

Sincerely yours,

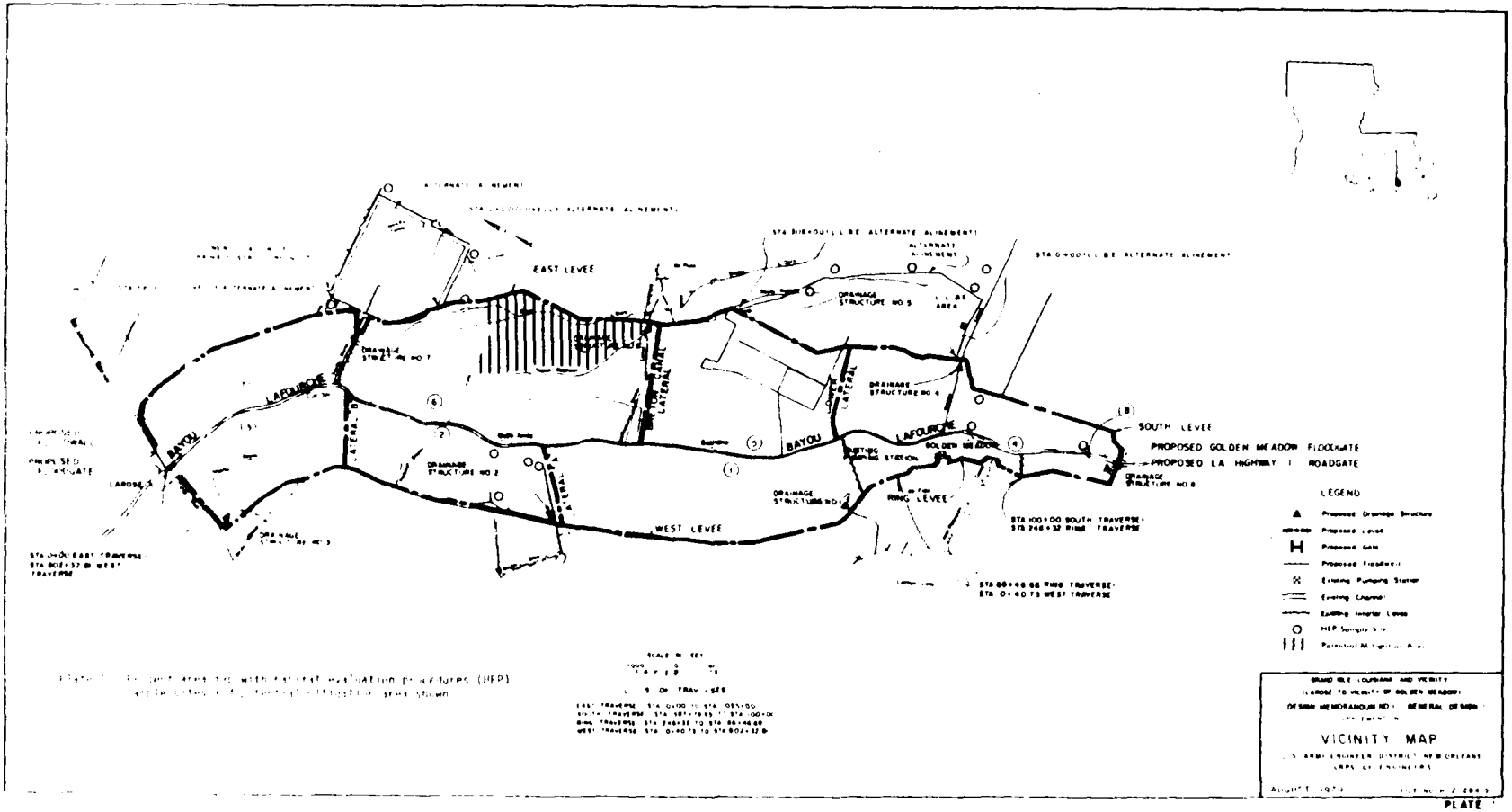
David W. Fruge
Acting Field Supervisor

Attachment: As Stated

cc: EPA, Dallas, Texas
NMFS, Galveston, Texas
La. Dept. of Wildlife and Fisheries, Baton Rouge, Louisiana
Area Office, FWS, Jackson, Mississippi
Regional Office, FWS, Atlanta, Georgia

LITERATURE CITED

Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U.S. Fish and Wildlife Service, Office of Biological Services. FWS/OBS 79/31. 103pp.


EAST LEVEE
WEST LEVEE
SOUTH LEVEE
LAFOURCHE BAYOU
PROPOSED GOLDEN MEADOW FLOODGATE
PROPOSED LA HIGHWAY 1 ROADGATE
DRAINAGE STRUCTURE NO 1
DRAINAGE STRUCTURE NO 2
DRAINAGE STRUCTURE NO 3
DRAINAGE STRUCTURE NO 4
DRAINAGE STRUCTURE NO 5
DRAINAGE STRUCTURE NO 6
RING LEVEE
LEGEND
Proposed Drainage Structure
Proposed Levee
Proposed Gate
Proposed Floodwall
Existing Pumping Station
Existing Channel
Existing Interior Levee
HEP Sample Site
VICINITY MAP
PLATE

State of Louisiana

DEPARTMENT OF WILDLIFE AND FISHERIES
NEW ORLEANS
504/342-5864

March 5, 1982

Mr. David Soileau
US FWS
P.O. Box 4305
Lafayette, La. 70502

RE: Larose to Golden Meadow, La. Hurricane protection project - HEP Report

Dear Mr. Soileau:

Personnel of the Department of Wildlife and Fisheries have reviewed the above referenced document and we concur in its conclusions and recommendations.

Sincerely,

Jesse J. Guidry

Jesse J. Guidry
Secretary

JJG:MBW:cgd

Appendix E

United States Department of the Interior

FISH AND WILDLIFE SERVICE

June 30, 1982

District Engineer
U.S. Army Corps of Engineers
P.O. Box 60267
New Orleans, Louisiana 70160

Dear Sir:

Reference is made to the authorized Larose to Golden Meadow, Louisiana, Hurricane Protection Project. In order to assist your staff in the development of a draft supplement to the environmental impact statement (EIS) and mitigation report for that project, the Fish and Wildlife Service (FWS) provided the results of our Habitat Evaluation Procedures (HEP) to you in our March 26, 1982, report. Subsequent to review of that report by your Environmental Section, an informal meeting between members of our respective staffs was held, and several possible discrepancies in the information provided in our HEP report were called to our attention. In addition, another alternative has been more seriously considered by your staff. By virtue of this letter officially addressing each apparent discrepancy and the additional alternative, we are supplementing our March 26, 1982, report and request that you make the appropriate additions and deletions thereto.

Possible discrepancies in our report include:

1) the assignment of a habitat unit value (HUV) of "0" to levees;

2) the projected decrease in the HUV of forested habitat from 12.1 to 10.7 within 5 years after completion of the first lift;

3) the EIS assumption that the HUV for each habitat type will remain the same throughout the project life, despite the above-cited decrease in the HUV of forested habitat; and

4) the ability to implement and totally mitigate for all project damages by preventing development and managing water levels in the marsh immediately west of the Section E south levee segment of the tentatively selected plan (TSP).

In our original report, levee habitat was given an HUV of "0"; whereas, pasture was given an HUV of 7.5. Your staff has pointed out that levee and pasture would likely have the same HUV. We agree with this rationale and have raised the HUV of levee habitat to 7.5. The 1,247 acres of levee created by implementation of the TSP will, therefore, contribute an additional 8,927 habitat units (HU's) annually under future with-project (FWP) conditions. With this contribution, the net annualized loss of HU's will be reduced from 89,413 to 80,486 when future without-project (FWOP) conditions are compared to FWP conditions for the TSP alignment.

We have reviewed the rationale used by the HEP team to project a decrease in the HUV of forested habitat that is enclosed by the levees from 32.1 to 10.7 within 5 years after completion of the first levee lift. The forested habitat in the project area is currently of low value to wildlife species. Dominant vegetation includes live oak, bald cypress, sweetgum, red maple, sugarberry, and palmetto. The wildlife value of the forested areas is limited by the low value of the dominant vegetation and further reduced by cattle that currently graze most of the forested area and compete with forest-dwelling species for food. The principal use of this area is by individuals seeking escape, resting, and nesting cover; however, those individuals use the adjacent marshes as their primary feeding area. During the field portion of the HEP analysis, the interagency team discussed the value of the forested habitat and based its rating of 32.1 on the fact that, in general, there was moderate to high quality marsh adjacent to the forested areas. Under FWP conditions, it was assumed that both the forested habitat and adjacent marshes would be drained and grazed within 5 years after completion of first levee lift. Therefore, as adjacent marshes are converted to pasture, a significant decrease in the value of forested habitats could be anticipated under FWP conditions. In a telephone conversation on February 25, 1982, the HEP team agreed that a HUV of 10.7 for forested habitat under FWP conditions would be acceptable. Thus, the Service maintains its position regarding the decreased HUV of forested habitat in the project area from 32.1 to 10.7 under FWP conditions.

Obviously, the statement in the first paragraph of the "RESULTS" section of our March 26 report in which we stated, "It was decided that the HUV for each habitat type would remain the same throughout the project life," is not correct. This should be changed to read: "It was decided that the HUV of all habitat types, except forested habitat, will remain the same throughout the project life. Forested habitat, as previously discussed, will decrease from 32.1 to 10.7 within 5 years after completion of the first levee lift under FWP conditions."

A potential alternative to mitigate for project damages to productive wetlands was briefly discussed in our HEP report. This alternative involved the purchase of easements and installation of structures to

prevent development and to manage water levels in the fresh/intermediate marsh immediately west of and adjacent to the [illegible] south levee segment. As stated in that report, estimates of [illegible] replacement associated with those mitigation measures were preliminary. Further refinement of marsh management measures and [illegible] replacement calculations would be needed to fully evaluate the proposed [illegible] plan.

Since submission of that report, we have been diligently working with members of your staff and the Louisiana Department of Wildlife and Fisheries in developing a mitigation plan that [illegible] marsh management on Point au Chien Wildlife Management Area [illegible]. [illegible] marsh within Point au Chien WMA is being lost at a [illegible] rate, [illegible] as a result of saltwater intrusion. Prompt measures [illegible] be taken to address this wetland deterioration problem before it [illegible] possible. Although the State of Louisiana is currently [illegible] projects to address coastal erosion, none of those [illegible] Point au Chien WMA. It is, therefore, expected that [illegible] that publicly-owned management area will be a preferable [illegible] to the plan proposed in our March 26, 1982 report. [illegible] that plan and its expected [illegible] regarding fulfillment [illegible] is forthcoming in a separate planning aid report.

Subsequent to [illegible] our March 26, 198[illegible] planning aid report containing a HEP analysis of the TSP, your staff [illegible] seriously consider an additional alternative, i.e., Plan 5. The levee alignment associated with Plan 5, as described by Corps personnel, [illegible] the same as the TSP alignment in every section except [illegible]. The Plan 5 alignment proposed for that levee section [illegible] an existing levee along the eastern edge of the Bayou [illegible] in a northerly direction from the [illegible] Canal for [illegible] before extending eastward toward West Fork Bayou [illegible] Farms. Although this alignment is somewhat longer [illegible] alignment, which follows the West Fork Bayou [illegible] Farms, project impacts to fish and wildlife [illegible] significantly reduced.

When compared to the [illegible] alignment, [illegible] proposed in Plan 5 would [illegible] and 5[illegible] more acres of [illegible] valuable fresh/intermediate marsh habitat. [illegible] levee would enclose [illegible] marsh, open water, and [illegible] habitat [illegible].

A HEP analysis of Plan [illegible] target [illegible] presented [illegible] letter. For comparison [illegible] the

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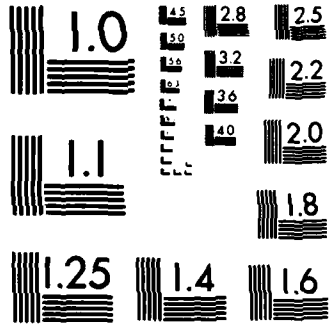


Table 1. A comparison of expected acreage losses, by habitat type, associated with completion of the tentatively selected plan (TSP) and Plan 5 for the Larose to Golden Meadow, Louisiana, Hurricane Protection Project.

Habitat Type	Acres to be impacted 1/		
	TSP	Plan 5	Difference
Fresh/intermediate marsh	360/723	265/137	-95/-586
Brackish/saline marsh	282/554	282/554	0/0
Open water	351/1124	358/773	+7/-351
Forested	254/744	307/358	+53/-386
Total	1247/3145	1212/1822	-35/-1323

1/ Area impacted by the project is listed as acres lost to levee construction/ acres enclosed by levee and based on 1975 adjusted acreages.

TSP but not affected by Plan 5 was included in the analysis, but no impacts to that area were attributed to this plan. That area has, however, been undergoing habitat changes due primarily to subsidence, and, as water in the neighboring marshes and water bodies becomes more saline, saltwater intrusion is also expected to play an important role in future habitat changes. Therefore, habitat acreages were adjusted accordingly. A comparison of annualized habitat acreages under FWOP and FWP conditions is presented in Table 2.

For determining impacts associated with Plan 5, the habitat acreages presented in Table 2 were multiplied by the appropriate HUV for each of the target years for both FWOP and FWP conditions (Table 3). The comparison of these two future conditions illustrates the total net annualized loss of 56,326 HU's associated with implementation of this plan. Using the same comparison to measure impacts associated with the TSP, it was determined that there would be a net annualized loss of 80,486 HU's.

Completion of the hurricane protection project using the Plan 5 levee alignment as opposed to the TSP alignment would reduce project impacts by over 24,000 HU's annually. Further comparison of the two plans indicates that implementation of Plan 5 would reduce the loss of valuable fish and wildlife habitat (i.e. fresh/intermediate marsh, brackish/saline marsh, open water, and forested habitats) by about 700 acres annually.

Based on these comparisons, the Service urges the Corps to adopt Plan 5 as the selected plan and to incorporate other recommendations, which were suggested in previous reports, into the selected plan in an effort to further reduce project impacts. Although the Service would favor the adoption of Plan 5 as the selected plan, we consider the loss of over 56,300 HU's to be significant and request that full mitigation for these losses be provided, should this plan be selected.

As stated previously, FWS personnel are presently working closely with Corps personnel in the development of an acceptable mitigation plan that will compensate for the HU's lost due to construction of the hurricane protection levee, regardless of the plan selected. Should you have any questions regarding this supplemental report, please contact Robert Strader of this office.

Sincerely,

David W. Fruge

David W. Fruge
Acting Field Supervisor

cc: EPA, Dallas, Texas
NMFS, Galveston, Texas
La. Dept. of Wildlife and Fisheries, Baton Rouge, Louisiana
Area Office, FWS, Jackson, Mississippi
Regional Office, FWS, Atlanta, Georgia

Table 2. Comparison of future without-project (FWOP) and future with-project (FWP) habitat acreage for Plan 5.

Target year		Habitat types (acres)								
		Fresh/intermediate marsh	Brackish/saline marsh	Open water	Forested	Forested (enclosed)	Levee	Pasture	Developed	Total
1975	FWOP	1,083	836	1,475	998	0	0	0	0	4,392
	FWP	1,083	836	1,475	998	0	0	0	0	4,392
1986	FWOP	756	896	1,742	846	0	0	128	24	4,392
	FWP	612	592	1,285	640	0	1,212	43	8	4,392
1991	FWOP	642	902	1,850	785	0	0	179	34	4,392
	FWP	403	77	545	262	358	1,212	1,524	11	4,392
1996	FWOP	545	898	1,951	728	0	0	227	43	4,392
	FWP	342	106	577	243	358	1,212	1,540	14	4,392
2006	FWOP	393	866	2,135	626	0	0	313	58	4,391
	FWP	247	144	633	209	358	1,212	1,569	19	4,391
2021	FWOP	240	787	2,368	500	0	0	419	78	4,392
	FWP	151	168	707	167	358	1,212	1,604	26	4,393
2046	FWOP	107	625	2,662	344	0	0	550	104	4,392
	FWP	67	160	799	116	358	1,212	1,647	34	4,393
2096	FWOP	21	349	3,023	162	0	0	702	134	4,391
	FWP	14	101	911	55	358	1,212	1,698	44	4,393
Annualized	FWOP	277	676	2,441	466	0	0	447	84	4,392
	FWP	202	200	828	210	318	1,157	1,450	28	4,393
Net Change		-75	-476	-1,613	-256	+318	+1,157	+1,003	-56	+1

Table 3. Comparison of future without-project (FWOP) and future with-project (FWP) habitat units for Plan 5.

Target year		Habitat units by habitat type 1/						
		Fresh/intermediate marsh	Brackish/saline marsh	Open water	Forested	Forested (enclosed)	Levee	Pasture
1975	FWOP	65,251	40,128	36,875	32,036	0	0	0
	FWP	65,251	40,128	36,875	32,036	0	0	0
1986	FWOP	45,549	43,008	43,550	27,157	0	0	960
	FWP	36,873	28,416	32,125	20,544	0	9,090	322
1991	FWOP	38,680	43,296	46,250	25,198	0	0	1,342
	FWP	24,281	3,696	13,625	8,410	3,831	9,090	11,430
1996	FWOP	32,836	43,104	48,775	23,369	0	0	1,702
	FWP	20,606	5,088	14,425	7,800	3,831	9,090	11,550
2006	FWOP	23,678	41,568	53,375	20,095	0	0	2,348
	FWP	14,882	6,912	15,825	6,709	3,831	9,090	11,768
2021	FWOP	14,460	37,776	59,200	16,050	0	0	3,142
	FWP	9,098	8,064	17,675	5,361	3,831	9,090	12,030
2046	FWOP	6,447	30,000	66,550	11,042	0	0	4,125
	FWP	4,037	7,680	19,975	3,724	3,831	9,090	12,352
2096	FWOP	1,265	16,752	75,575	5,200	0	0	5,265
	FWP	844	4,848	22,775	1,766	3,831	9,090	12,735
Annualized	FWOP	16,707	32,425	61,029	14,967	0	0	3,353
	FWP	12,151	9,600	20,710	6,741	3,403	8,677	10,873
Net Change		-4,556	-22,825	-40,319	-8,226	+3,403	+8,677	+7,520

1/ Because developed habitat has a habitat unit value (HUV) of "0", no comparison of HU's was made under future conditions either without- or with-project.

Appendix F

February 24, 1982

District Engineer
U.S. Army Corps of Engineers
P.O. Box 60267
New Orleans, Louisiana 70160

Dear Sir:

Reference is made to the Larose to Golden Meadow, Louisiana, Hurricane Protection Project. The Fish and Wildlife Service is assisting your staff in the development of a mitigation plan and supplemental environmental impact statement (EIS) for that project. As part of this cooperative effort, your Recreation Planning Section has requested that we develop estimates of sport hunting potential (man-days) for the various habitat types within the study area. This letter, which is provided on a planning aid basis, provides the requested estimates of sport hunting potential and a synopsis of the methodology used in the development of those values.

Potential sport hunting (man-day) values per acre of habitat were computed using the following equations:

Population density (animals/acre)	X	Maximum sustainable annual harvest rate	=	Harvestable population (animals/acre)
Harvestable population	X	Hunter success rate (man-days effort/animal harvested)	=	Potential number of man-days of sport hunting per acre annually

The species and man-day values used for this project are presented, by habitat type, in Table 1. A discussion of data used in obtaining these values follows that table.

Table 1. Potential sport hunting (man-day) value per acre for selected game species and habitats within the study area.

Species	Fresh/intermediate marsh	Brackish/saline marsh	Bottomland hardwoods	Wooded swamp	Pasture
Deer	0.250	Neg.	0.130	0.130	Neg.
Rabbit	0.176	0.141	0.176	0.176	0.176
Squirrel	N/A	N/A	0.161	0.161	N/A
Waterfowl	0.488	0.383	0.016	0.053	Neg.
Marsh birds	0.254	0.261	Neg.	Neg.	Neg.

Deer Hunting - The value used for deer population density in fresh/intermediate marsh was 1 deer per 35-acres. This value was taken from Gosselink et al. (1979) and Joanen et al. (1981). The deer population density used for poor quality bottomland hardwoods (BLH), such as those found in the project area, and wooded swamp(WS) was 1 deer per 60-acres (U.S. Army Corps of Engineers, New Orleans District [1977] and the 1975 wildlife surveys for Lafourche Parish conducted by the Louisiana Department of Wildlife and Fisheries [LDWF]). The commonly accepted, maximum sustainable annual harvest rate is 33 percent. The hunter success rate (i.e., average number of days of hunting to kill 1 deer) used in this analysis was 26.5 for fresh/intermediate marsh and 23.7 for BLH and WS habitats. These values were taken from the LDWF 1980-81 deer kill survey. Deer populations in brackish/saline marsh and pasture are negligible.

Rabbit Hunting - Population density values for rabbits were 1 rabbit per 2-acres in fresh/intermediate marsh, BLH, WS, and pasture habitats, and 1 rabbit per 2.5-acres in brackish/saline marsh. These values were attained from the 1975 LDWF Lafourche Parish wildlife population survey. A sustained annual harvest rate of 60 percent is commonly accepted by wildlife biologists and was used for these estimates. A hunter success rate of 0.586, derived from the LDWF 1977-78 small game survey, was used for all habitat types.

Squirrel Hunting - Man-day use figures for squirrels were only determined for BLH and WS Habitats. A population density of 1 squirrel per 2-acres was used for both habitat types. This figure, which is a low estimate of potential squirrel populations, is thought to be realistic for the poor quality habitat that presently exists in the project area. A commonly accepted, sustained annual harvest rate of 60 percent was used. A hunter success rate of 0.537 was taken from the LDWF 1977-78 small game survey and used for the project area.

Waterfowl Hunting - Man-day values for migratory waterfowl hunting in fresh and intermediate marsh habitat were based on records for public waterfowl hunting on Lacassine and Sabine National Wildlife Refuges during the 1978-79 hunting season. Values of 0.454 man-days per acre for fresh marsh and 0.521 man-days per acre for intermediate marsh were averaged to establish the 0.488 man-day per acre value used for fresh/intermediate marsh. The man-day value for brackish/saline marsh was taken from the U.S. Fish and Wildlife Service Table A-3 (1980). For BLH, a population density of 1 duck per 10aacres, a sustained annual harvest rate of 40 percent, and a hunter success rate of 0.4 were used. These figures were taken from U.S. Fish and Wildlife Service (1980) and Kennedy (1977).

Marsh Bird Hunting - This included other game birds, including coots, rails, and snipe, that are commonly found in the marsh. Man-day values for these species for all marsh habitat were taken from Table 27 of the U.S. Army Corps of Engineers (1974). These values were averaged to obtain the man-day values for fresh/intermediate marsh and brackish/saline marsh habitat types. Populations, and therefore, man-day usage of these species in BLH, WS, and pasture is negligible.

If you have any questions regarding the above estimates and/or rationale, please contact Robert Strader with this office.

Sincerely,

David M. Soileau
Acting Field Supervisor

Literature Cited

Gosselink, J.C., C.L. Cordes, and J.W. Parsons. 1979. An ecological characterization study of the Chenier Plain coastal ecosystem of Louisiana and Texas. Volume I: narrative report. U.S. Fish and Wildlife Service, Office of Biological Services. FWS/OBS - 78/9. 302 pp.

Joanen, T., L. McNease, and J. Robinette. 1981. Estimate of coastal deer population from an aerial survey conducted on 7 April 1981, Cameron Parish, Louisiana. Louisiana Department of Wildlife and Fisheries. Grand Chenier, Louisiana. 4 pp.

Kennedy, R.S. 1977. Ecological analysis and population estimates of the birds of the Atchafalaya River Basin in Louisiana. Ph.D. dissertation. Louisiana State University, Baton Rouge. 201 pp.

U.S. Army Corps of Engineers, New Orleans District. 974. Louisiana coastal area study: fish and wildlife study of a Louisiana coastal area and Atchafalaya Basin Floodway. Appendix D-2: Methodology for estimating the fish and wildlife sport harvest. New Orleans, Louisiana. Pages D-7 to D-52.

U.S. Army Corps of Engineers. 1977. Value of wetlands and bottomland hardwoods. Mimeograph report, Environmental Quality Section, New Orleans District. 30 pp.

U.S. Fish and Wildlife Service. 1980. A planning aid report on the Mississippi and Louisiana estuarine areas study. Lafayette, Louisiana. 86 pp + appendix.

Appendix G

July 1, 1981

IN REPLY REFER TO:
Log no. 4-3-81-147

Mr. James F. Roy
Chief, Planning Division
Department of the Army
New Orleans District, Corps of Engineers
LMNPD-RE
P.O. Box 60267
New Orleans, Louisiana 70160

Dear Mr. Roy:

This refers to your letter of June 9, 1981, in which you requested endangered species information for the area of the Larose to Golden Meadow Hurricane Protection Project located in Lafourche Parish, Louisiana.

Our data indicate that there are no endangered, threatened, or proposed species likely to reside in the project area, and there is no designated Critical Habitat in the vicinity of this project. Therefore, no further endangered species coordination will be required for this project, as described. If you anticipate any changes in project location or activities, however, please contact our office for further coordination.

If you have any questions concerning this project, please contact Fred Bagley of our staff, telephone number 601/960-4912 or FTS 490-4912.

We appreciate your participation in the effort to ensure the survival of endangered species.

Sincerely,

Gary L. Hickman
Area Manager

cc: [illegible] (FWS-[illegible])
[illegible] Lafayette, LA
Department of Wildlife & Fisheries
New Orleans, LA

☑ Section 7

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P. O. BOX 60267
NEW ORLEANS, LOUISIANA 70160

Log No. [illegible]
File No.
IRP.
Lead
Findings
MH

JUN 10 1981
U.S. Fish & Wildlife Service
Jackson Area Office

LMNPD-RE

9 June 1981

Mr. Gary Hickman
Area Manager
US Department of Interior
Fish and Wildlife Service
200 East Pascagoula St., Suite 300
Jackson, MS 39201

Dear Mr. Hickman:

In compliance with Section 7(c) of the Endangered Species Act Amendments of 1978, we are requesting information concerning the threatened and/or endangered species associated with the project, Larose to Golden Meadow, Louisiana, Hurricane Protection, located in Lafourche Parish in southeast Louisiana (Inclosure 1).

Plans for the project include the construction of a floodgate on Bayou Lafourche south of Golden Meadow, construction of the portions of the levee remaining to be built on the west and east side of the bayou, and proposed construction along alinements around Clovelly Farms and the Louisiana Lands and Exploration area (shown in blue, Inclosure 2).

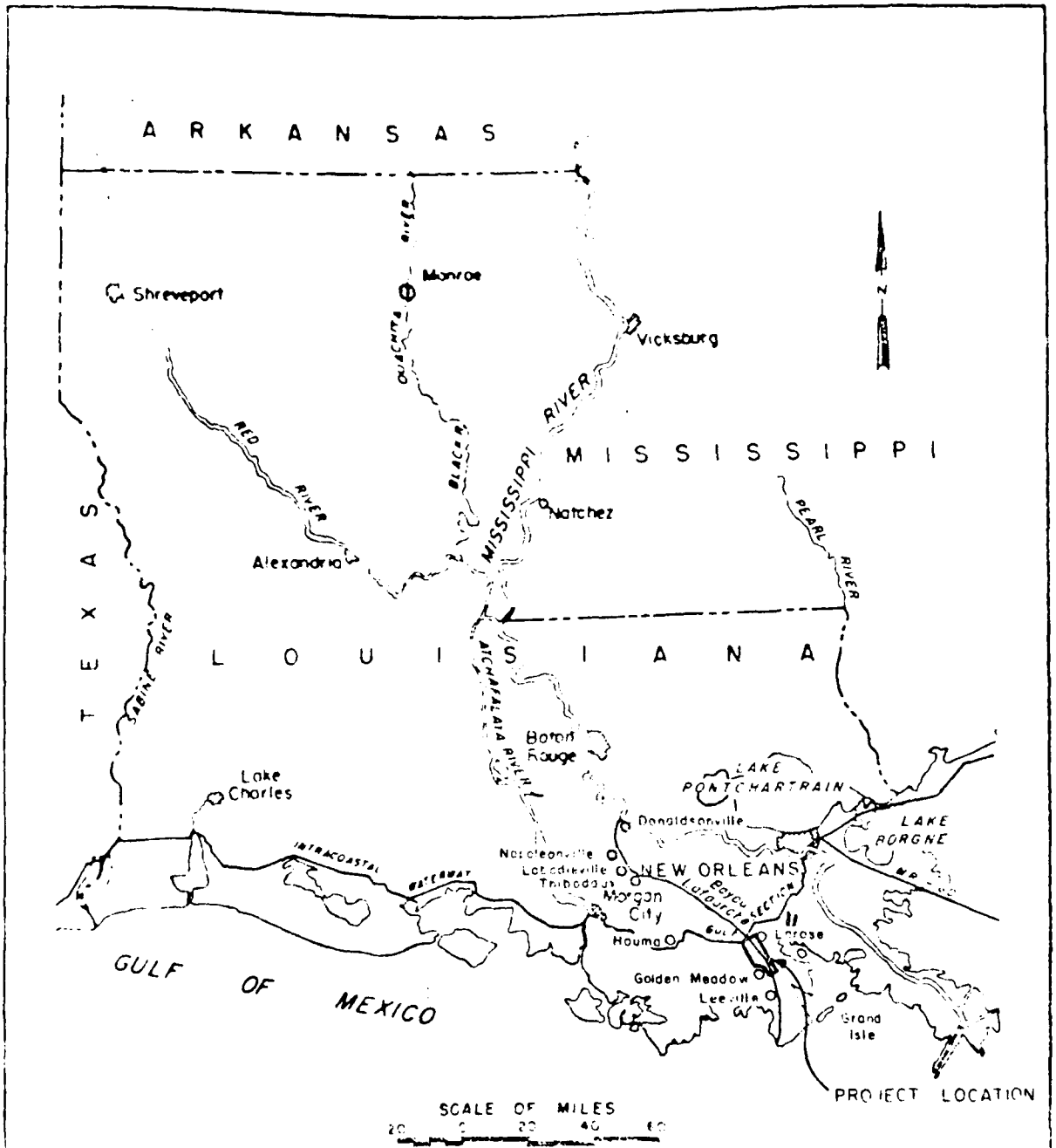
The project area is primarily drained wetlands surrounded by intermediate and brackish marsh, cypress-tupelogum swamp, and some natural ridge forest.

Please provide us with a list of endangered and threatened species and species proposed for listing which may occur in the project area.

Sincerely,

2 Inclosures
As stated

JAMES F. KOT
Chief, Planning Division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Vicksburg
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BLACK
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MISSISSIPPI
Natchez
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Alexandria
TEXAS
SABINE RIVER
LOUISIANA
ATCHAFALAYA RIVER
Baton Rouge
Lake Charles
LAKE PONTCHARTRAIN
Donaldsonville
LAKE BORGNE
INTRACOASTAL WATERWAY
Napoleonville
Lockport
Thibodaux
NEW ORLEANS
Morgan City
Houma
Larose
Golden Meadow
Leeville
Grand Isle
GULF OF MEXICO
PROJECT LOCATION
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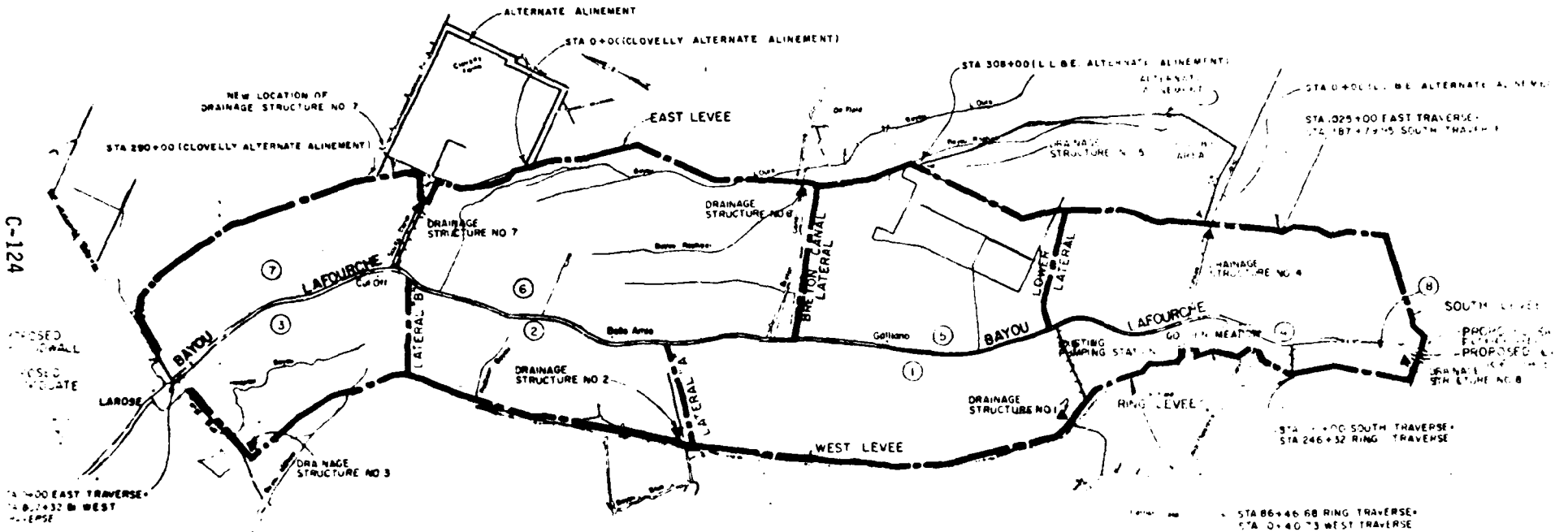
C-123



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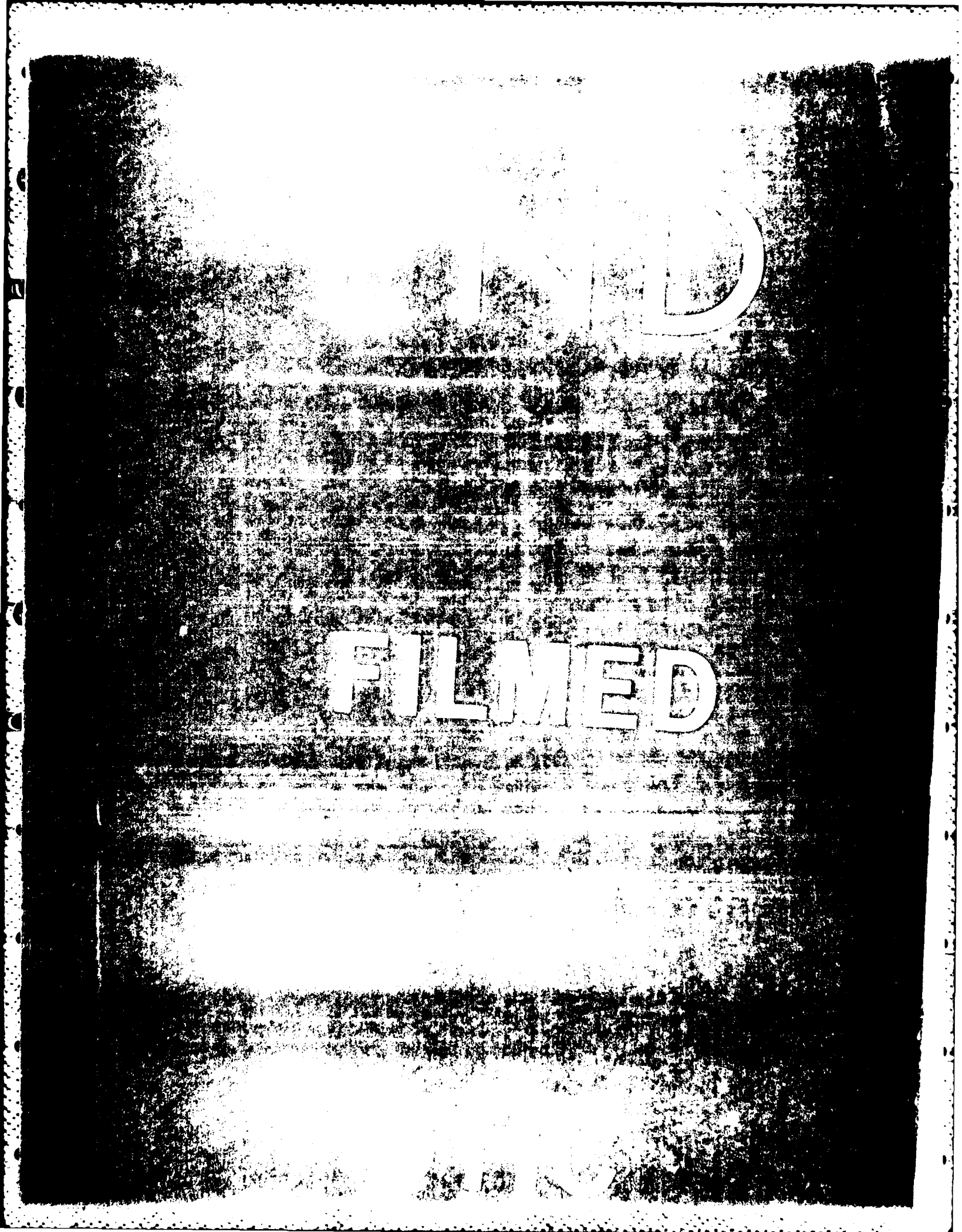
RING TRAVERSE STA 246+32 TO STA 86+46.68
WEST TRAVERSE STA 0+40.73 TO STA 802+32.81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